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USING THE HEALTH BELIEF MODEL TO PREDICT BREAST CANCER-RELATED INFORMATION SEEKING

By

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ABSTRACT

USING THE HEALTH BELIEF MODEL TO PREDICT BREAST CANCER-RELATED INFORMATION SEEKING

By

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This study examined the heuristic value of the Health Belief Model (HBM) for predicting women's breast cancer-related information seeking behavior. Although the traditional HBM specifies a variety of indirect rather than direct relationships between variables in the model, these specific causal links have not been tested. The aim of the current study was to assess these relationships as well as test the HBM's ability to predict intentions to seek breast cancer-related information from a variety of information carriers.

A sample of N=317 adult women were interviewed about their breast cancer beliefs and their intentions to seek breast cancer-related information from a variety of information carriers (i.e. doctors/health professionals, friends or relatives, health organizations, magazines and television). A combination of confirmatory factor analyses, multiple regression analyses and path analyses was used in the investigation.

Results showed that different models were suggested for predicting intentions to seek information from authoritative interpersonal information carriers (i.e.physicians and other health professionals) than for intentions to engage in more generalized information seeking.

Regression analyses showed that many of the variables incorporated in the HBM were not statistically significant predictor variables of either intermediate or outcome variables. Path analyses showed that although many of the indirect relationships suggested by the HBM were supported, it appeared that several exogenous variables were found to be endogenous instead. The results of this investigation are discussed in terms of their theoretical, methodological and pragmatic implications.

To my parents,

who made this "American Adventure" possible

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CHAPTER ONE

THEORETICAL RATIONALE

After heart disease, cancer is the second leading cause of death in the U.S. population and the leading cause of death for women 35 to 74 (Silverberg, Boring, & Squires, 1990). Breast cancer will affect 1 in 9 American women during her life-time and is estimated to claim 44,800 lives in 1991 alone (American Cancer Society, 1991). To date, early detection is the best way of combatting this disease (Seidman, Gelb, Silverberg, LaVerda, & Lubera, 1987). On the whole it is estimated that 30 to 50 percent of breast cancer mortality could be reduced with early detection (Howard, 1987). Although there is some controversy about the benefits of mammography screening for women under the age of 50 (Miller, 1991), research has shown that mammography screening (especially when it is combined with a physical breast exam) has been effective in reducing breast cancer mortality (Seidman et al., 1987; Howard, 1987). Nevertheless, mammography screening is generally underutilized as a screening technique (Fox, Baum, Klos & Tsou, 1985; Howard, 1987). This underuse of mammography screening can be partly attributed to the beliefs and/or misconceptions on the part of the physician (Rimer, Keintz, Kessler, Engstrom, & Rosan, 1989; Albanes, Weinberg, Boss & Taylor, 1988; Cummings, Funch, Mettlin, & Jennings, 1983) as well as the client (Fox, et al., 1985; Howard, 1987; Rimer et

al., 1989). Women appear to hold many misconceptions about mammography screening in terms of the level of radiation involved in the procedure and the necessity of a mammography in the absense of symptoms or a physician recommendation (Rimer et al., 1989; Rutledge, Hartmann, Kinman, & Winfield, 1988; Stomper, Gelman, Meyer, & Gross, 1990). Other barriers to mammography screening include anxiety over, or fear of, a positive result (French, et al.,1982; Schwoon & Schmoll,1979), embarrassment, and concern about time and cost of the procedure (Lerman, Rimer, Trock, Balshem, & Engstrom, 1990). Research also shows that knowledge about breast cancer and breast cancer screening (Rutledge et al., 1988) as well as a positive attitude toward screening (Rutledge et al., 1988; Vernon, LaVille, & Jackson, 1990; Reynolds, West, & Aiken, 1990) or toward the possibilities of curing cancer, have been found to be positively related to breast cancer screening (Hobbs, Smith, George, & Sellwood, 1980). Therefore, changing women's attitudes and beliefs regarding breast cancer screening could be critical to controlling this disease.

These changes might be partially accomplished through a better understanding of women's information seeking concerning breast cancer. In particular, what information sources women are likely to actively seek out for breast cancer-related information and what the motivations are behind these information seeking patterns. The focus on information seeking in controlling breast cancer is

important for several reasons. First, much health behavior (e.g., breast cancer screening) involves acting on the basis of personal (Lenz, 1984) and informed (Hibbard & Weeks, 1987) judgment. The scope and nature of the information on which to base these judgments, the repertoire of alternative courses of action known to the searcher and ultimately the action taken are affected by individuals' information seeking behaviors (Lenz, 1984). In this sense information seeking can be viewed as "one step in a chain of behaviors which ultimately might lead to positive (health) consequences" (Wallston, Maides & Wallston, 1976, p. 215). Second, health information seeking can be important in reducing uncertainty and increasing cognitive coping with a disease (Lenz, 1984). Atkin (1973) suggests that motivations for information seeking in general include a desire to increase awareness and understanding of the environment with which the individual is confronted (cognitive adaptation) as well as a desire to form an affective disposition toward an object, such as an attitude, value, opinion, or emotion (affective adaptation). In this light women might, besides seeking information on which to base health-related decisions, seek information to become generally more aware or to form an attitude about breast cancer-related issues. Thus, breast cancer-related information seeking might affect women's beliefs, attitudes as well as their health behaviors. The current study is concerned with the investigation of

information seeking patterns exclusively.

Although there are several studies which have focused specifically on cancer and/or health information seeking (Wallston, Maides & Wallston, 1976; DeVito, Bogdanowicz, & Reznikoff, 1982; Johnson, Meischke, Grau & Johnson, in press; Johnson & Meischke, 1991a, 1991b; Rakowski et al., 1990), a theoretical foundation on which to base predictions is only now starting to emerge. There are several theories such as Uses and Gratifications and Dependency theory, which have been developed to explain individuals' purposive or non-purposive exposure to various mass media and/or media content (Rubin, 1986a; Jeffres, 1986). However, exposure to alternative sources are only marginally incorporated in these theories.

There are also several theoretical models which lay out antecedent as well as process variables in general information seeking behavior (Atkin, 1973; Lenz, 1984) which could (and have to some extent) been applied to health-related information seeking. Attempts have been made to develop health-information seeking frameworks either by combining several of these general models, such as Freimuth, Stein, & Kean's, (1989) Health Information Acquisition Model, or by developing entirely new models of health information seeking, such as Johnson's (1988) Information Seeking Stage Model (ISSM) and his Comprehensive Information Seeking model (CISM) (Johnson, 1991). Although these models are useful frameworks for the investigation of the health-information

search process, they have certain limitations.

The Health Information Acquisition Model suggests that the process of health-related information seeking is composed of six steps: 1) a stimulus (some external or internal stimulus which triggers some comparison of stored information and needed information) 2) information goals (which pertains to goal setting prior to the actual search), 3) cost/benefit analysis (the anticipated cost/benefit ratio of the information search), 4) search behaviors (the actual behaviors that are enacted in the information search), 5) evaluation of the information and 6) decision point on information adequacy (which pertains to the decision to either continue or discontinue the information search). Although the Health Information Acquisition Model is a useful framework for the investigation of health information acquisition, it is a fairly general and non-disease specific model which focuses more on information seeking as a process than on the antecedents of disease-specific information seeking, which is the focus of the current study.

Johnson's (1988) Information Seeking Stage Model suggests that an individual's purposive information seeking will differ at crucial stages of his/her own personal experience with cancer. As individuals' experience with cancer hits closer to home, information needs and subsequent information seeking patterns will differ. The ISSM model suggests four distinct stages; the casual stage, the

purposive-placid stage , the purposive-clustered stage and the directed stage. The casual stage is the stage at which the experience with cancer in the environment is minimal. Consequently information seeking related to cancer is characterized as accidental. However, as cancer hits closer to home people are believed to experience greater information needs, resulting in more rational and purposive information searches. At the second stage, the purposive-placid stage, more purposive information seeking is triggered, although there is no particular urgency. At the third stage, the purposive-clustered stage, the information search becomes much more focused and extensive with a focus on finding out if one is or isn't affected by cancer. The last stage, the directed stage of information seeking begins after diagnosis of the illness and the start of a treatment plan. At this stage information seeking is one of the primary functional coping strategies a cancer patient has at his/her disposal.

Each of the stages in this model is characterized by different information needs stemming from different experiences with cancer in one's environment, which impacts on the information search. Although this model is a disease-specific (i.e., cancer) and theoretically attractive model, it is difficult to investigate empirically because of its inherently dynamic nature and the difficulty with specification of a progression through particular disease

states.

Johnson's (1991) Comprehensive Information Seeking Model (CISM) is a synthesis of three theoretical research streams: The Health Belief Model, Uses and Gratifications theory and a model of Media Exposure and Appraisal. This model predicts that demographics, direct experience, salience and beliefs about a particular disease impact on individuals' perceptions of channel and source characteristics and utility of information. These channel and source characteristics in turn are believed to predict the nature of an individual's information seeking actions.

Although the CISM model incorporates both communication and health behavior variables as antecedents for information seeking, it departs in several respects from traditional health-related approaches to this problem.

Yet another way to establish a theoretical framework for health-information seeking is to determine if a purely health behavior-oriented framework, such as the Health Belief Model (HBM) can be generalized to predicting health-related information seeking. An advantage of pursuing the latter rather than the former is that it offers the potential for investigating disease-specific information seeking with a theoretically grounded and empirically well established framework.

The Health Belief Model

The Health Belief Model, which is a social-psychological model based on Value-Expectancy theory, has been used extensively to explain and predict specific preventive health behaviors (Janz & Becker, 1984). This largely cognitive model is based on the assumption that people generally pursue positively valued outcomes and avoid negatively valued outcomes. Behavior then is believed to be a function of the subjective value of an outcome and of the subjective probability (or "expectation") that a particular action will achieve that outcome (Rosenstock, Strecher, & Becker, 1988). In terms of health behavior, individuals are assumed to be motivated to act in ways that avoid disease (negatively valued outcome) and optimize good health (positively valued outcome). Specifically the Health Belief Model suggests that an individual will take some preventive health action when that person perceives him/herself to be susceptible to a disease, when the disease is perceived as a serious illness and when the benefits to undertaking the recommended health behavior outweigh the barriers (Rosenstock, 1974; Janz & Becker, 1984). The combined levels of susceptibility and severity are thought to provide the energy and force to act whereas the perceptions of benefits (less barriers) are thought to provide the preferred path of action (Rosenstock, 1974). However, some stimulus (called a cue to action) is believed to be necessary to set the cognitive and

behavioral processes in motion. These cues can be either internal, such as symptoms, or external, such as a PSA or an interaction with friends or relatives. Other variables such as demographic, socio-psychological and structural variables are believed to indirectly impact on the outcome variable by their influence on individuals' threat perceptions and perceptions of the benefits of preventive actions (Rosenstock, 1974; 1990) (see Figure 1).

Figure 1 About Here

Since its birth the HBM framework has been used for studying a wide variety of health behaviors, from obtaining immunizations to patients' compliance with prescribed regimens (Janz & Becker, 1984), attendance for prenatal care (Zweig, LeFevre, & Kruse, 1988), compliance with dieting and exercise behavior (Becker, Maiman, Kirscht, Haefner, & Drachman, 1977; O'Connel, Price, Roberts, Jurs, & McKinley, 1985), compliance with cancer treatment (Newell, Price, Roberts & Baumann, 1986), dental care (Kegeles & Lund, 1984), teen pregnancy and pregnancy prevention (Nathanson & Becker, 1983; Eisen, Zellman & McAlister, 1985), contraceptive choice (Condelli, 1986), STD prevention (Hingson, Strunin, Berlin & Heeren, 1990; Simon & Das, 1984), breast self-exams (Stillman, 1977; Grady, Kegeles, Lund, Wolk, & Farber, 1983; Champion, 1985; Massey, 1986;

Strauss, Solomon, Costanza, Worden & Foster, 1987; Nemcek, 1990a; Shepperd, Solomon, Atkins, Foster, & Frankowski, 1990), to mammography screening (Calnan, 1984; Rutledge et al., 1988; Rimer, Davis, Engstrom, & Meyers, 1988).

This basic HBM has been expanded by its founding fathers over the years to incorporate several other variables, such as locus of control and self-efficacy (Rosenstock et al. 1988), but most notably, a variable called health motivation (Becker et al., 1977). Health motivation refers to the degree of concern about health matters in general. This general health concern which has been added as a third main component in the HBM is believed to provide the general motivation to make health issues salient and/or relevant which will directly impact on people's likelihood of taking some preventive health action (Rosenstock et al. 1988). The addition of this variable makes the model less of a disease-avoidance framework. However, in most empirical investigations the focus has been on the impact of the perceived threat and cost/benefit analysis on preventive health behaviors. Variables such as health motivation, (health) locus of control, self-efficacy as well as cues to action have received almost no attention at all.

Communication variables in the Health Belief Model have traditionally been incorporated only as one of many possible "cues to action". In the current study, the aim is to adapt

the HBM to investigate its usefulness in predicting breast cancer information seeking among adult women. In doing so the communication variables are treated as outcome variables instead of merely "cues to action". The underlying assumptions are that a) health-related information seeking can be viewed as a preventive health behavior in and of itself which can be predicted from the main components in the model in the same manner as other preventive health behaviors, and b) that health-related information seeking can mediate other preventive health behaviors. This study will treat information seeking as the dependent variable in the HBM. Only if information seeking can be predicted from the components in the HBM will it be useful to extend the model by treating information seeking as a variable which mediates preventive health behaviors such as breast cancer screening.

The objective of this study then is to test the heuristic value of a traditionally health behavior-oriented framework for predicting women's breast cancer-related information seeking behaviors. This will not only break new ground theoretically, it will also provide important information about relationships between health beliefs and health information seeking.

The importance of focusing on information seeking as an outcome variable is reinforced by the fact that a great many preventive health campaigns currently advocate health-

related information seeking rather than target a specific health behavior directly (i.e. "Get the facts about Aids"; "Ask your doctor about Rogaine", etc.). Therefore, the results of this study could also have important pragmatic implications for the dissemination of breast cancer-related information.

Health Information Seeking and Other Preventive Health Behaviors.

Traditionally, the outcome variables in the HBM have been specific health behaviors (such as obtaining flu shots, performing breast self-exams or compliance with prescribed regimens etc.). In treating information seeking as a dependent variable in the HBM, conceptual distinctions need to be made between health information seeking behavior and other non-information seeking preventive health behaviors.

Information seeking has been defined as the "purposive acquisition of information from selected information carriers" (Johnson, 1988, p.1). This definition suggests that there are "active seekers" and "passive receivers" of health information. Information carriers here refer to the combination of channel, source and message. Only people who actively or purposively seek out information from an information carrier are said to be information seekers. Although there are many ways (i.e., accidental or purposive) in which an individual can acquire health information it is

"highly probable that information which is sought will have a greater impact than that which is merely offered" (Swinehart, 1968, p. 1265). Among other information, people can seek out health-related information.

There are many definitions of preventive health behaviors. Some definitions refer to medically recommended actions which are voluntarily undertaken by a person who believes himself to be healthy in order to prevent disease or disability and/or detect disease in an asymptomatic stage (Langlie, 1977). Other definitions refer to "any behavior that people engage in spontaneously or can be induced to perform with the intention of alleviating the impact of potential risk and hazards in their environments" (Kirscht, 1983, p. 278). These behaviors can refer to primary, secondary and tertiary preventive behaviors. They can consist of one single self-contained act or include long-term behavior change or behavior maintenance. All of these preventive health behaviors can incorporate communication variables since people are likely to seek out information about these behaviors and their consequences. Some health behaviors could be seen as being simultaneously health as well as information seeking behaviors. For instance, diagnostic behaviors (such as having a mammogram or breast self examination (BSE)) can be classified as communication variables since the objective of these behaviors is to find out specific information about one's health condition.

However, these diagnostic types of behaviors do not include encoding and decoding of messages in the same way that obtaining and reading a pamphlet or calling a cancer hotline would. Since many health behaviors can be classified as information seeking behaviors or vice versa, behaviors which include an active and purposive search for some form of information which involves encoding and decoding of symbolic messages will be included under information seeking (i.e. seeking out information about breast cancer prevention or detection from a doctor or friend or the media). Behaviors which do not include an active search for some form of information and do not involve encoding and decoding of messages (i.e., making dietary changes, quitting smoking, exercising, etc.) can be classified as purely health behaviors, even though it is likely that prior to or concurrently with these behaviors, information seeking will have or is currently taking place. In the current study, only purely information seeking behaviors (where people actively engage in encoding and decoding of symbolic messages) are investigated as outcome variables in the HBM.

Although there is a wealth of literature on the use of the HBM in the area of preventive health behaviors, there is, as far as this author is aware, no literature on the use of the HBM in predicting health-related information seeking. The next part of this paper presents a brief overview of some of the characteristics of information seeking per se,

followed by an overview of theoretical and empirical work which suggest tentative predictions about the nature of the individual relationships between each of the HBM components in the model. Lastly, some predictions will be made about HBM's overall ability to predict breast cancer-related information seeking.

The Information Search

The extent of an individual's information search has been defined by Lenz (1984) as the "total number of activities carried out" (p. 63). Part of the information search pertains to the scope of the search, or the number of alternatives investigated by the searcher. In terms of cancer-related information seeking, scope of the search pertains to the number of different information carriers (e.g., physician, friend, organization, etc.) an individual actively seeks information from. The more extensive the search the broader the scope of the search.

Information carrier characteristics

Individuals receive cancer and other health-related information from a variety of information carriers including: friends and relatives, physicians, cancer-related organizations and the media (Freimuth et al., 1989; Mettlin, Mirand, Sciandra, & Walsh, 1980; Johnson et al., in press). These information carriers have inherent differences

in terms of their capabilities of handling cancer-related information. These differences are reflected in the fact that typically respondents report consulting more than one of these carriers (Mettlin et al., 1980).

Communication research has traditionally distinguished between two fundamental types of channels: interpersonal, involving primarily face-to-face interactions (friends, family , doctors, etc.), and mass media (print and electronic). These channel types tend to have different properties which may impact on individuals' decision to use them for health-related information. There are several dimensions along which interpersonal and mass media channels differ.

Audience reach, cost and efficiency

Mass media channels tend to provide information of a fairly general nature to a large audience with considerable speed and efficiency (Schramm, 1973; Jeffres, 1986). Interpersonal channels tend to be much less efficient, more costly and tend to reach fewer individuals than most of the mass media do.

The mass media are better at creating awareness on a certain topic in a relatively short period of time. This increased awareness may in and of itself be sufficient to trigger information seeking. Anderson, Meissner and Portnoy (1989) found in their investigation on how individuals find

out about the CIS (Cancer Information Service) hotline, that "televised messages, followed to a lesser extent by printed materials and other media, are capable of either stimulating a search for information on cancer prevention and early detection, or at least increasing awareness of the CIS as a source of information for those already engaged in the information acquisition process" (p. 424).

Specialization and personalization

Interpersonal channels tend to be better suited for disseminating messages to specific subgroups or individuals than the mass media where the message tends to be geared toward more of a "general or heterogenous" audience. Interpersonal channels tend to be geared more toward a homogeneous audience (Jeffres, 1986). Interpersonal channels are better suited to handle special individual needs and questions due to the channel characteristics of immediate feedback and the situation specificity of their communication (Schramm, 1973). In terms of dissemination of health-related information they are viewed as more effective in reducing uncertainty because they provide social support and enhance confidence in suggested outcomes (Albrecht & Adelman, 1987). For these reasons interpersonal channels might be more useful than the mass media in presenting anxiety inducing information, such as breast cancer-related information.

Intrusiveness and decoding ease

Interpersonal channels tend to be more intrusive than mass media channels (Atkin, 1981). Due to the fact that interpersonal communication involves the largest number of meaning modalities (i.e. the array of senses employed for conveying meaning), decoding messages is easier with interpersonal than mass media channels. Interpersonal communication also facilitates participation in the communication event, thereby stimulating information processing. Therefore, interpersonal channels appear to be superior to mass media channels for dissemination of rather complex and serious information , such as breast-cancer related information. However, Atkin (1981) suggests that when it comes to depth capacity, print media tend to be superior over interperonal channels since more detail can be provided on paper (which can be reread and saved for later use) than can be conveyed (and remembered) in an interpersonal interaction. Broadcast media have the least ability to convey complex and detailed information (Atkin, 1981).

Within interpersonal and mass media channels there are a number of communication carriers individuals can turn to for cancer-related information. For instance, individuals might seek out cancer information from friends, family, other patients or from physicians or other health professionals. Or individuals might seek out information from magazines, newspapers, radio or television. These

communication carriers differ not only in their channel characteristics (i.e. interpersonal versus mass media), they also differ in source (expert versus lay person) and message characteristics (i.e. social support versus technical information), as well as the level of accessibility to the searcher and expectations for fulfilling certain information needs.

For instance, Worsley (1989) found that reliability ratings of sources of health-related information were related to referrals to these sources. Research shows that authoritative sources such as the family doctor and pharmacist are generally regarded as the most reliable sources for every day health matters, whereas TV advertisements, newspaper and magazine articles are among the least reliable sources (Worsley, 1989). Johnson and Meischke, (1991a) found that women over forty preferred more authoritative, specialized sources such as physicians and health organizations for receiving cancer information. This despite the fact that respondents reported (as has been found in other studies) to get most of their health information from the mass media (Freimuth et al., 1989; Johnson et al., in press). For most any kind of cancer content (e.g. detection, treatment, coping, etc.) doctors appeared to be the preferred choice over health organizations, friends/family and the media, although the narrow range of differences in information source means for "prevention information" indicated that women

might turn to a variety of information sources for such cancer content (Johnson & Meischke, 1991a).

The differences in communication carrier properties are likely to influence the scope of the information search. The focus of the current study is on antecedent variables which will predict the scope of a woman's breast cancer-related information search.

Cancer content

Although communication carrier characteristics are likely to influence the scope of the individual's information search, the search topic is also important in understanding the information search.

For general cancer information, a survey sponsored by the American Cancer Society found that 82% of respondents cited television, 65% newspapers, 61% magazines and 42% radio as cancer information sources (as cited in Signorielli, 1990). Unfortunately, cancer-related information presented in the mass media appears to be rather non-specific. Although women might find some information on breast cancer prevention and breast cancer detection in the media, a study by Freimuth et al., (1984) revealed that only 5% of news stories covered information about prevention. There also appeared to be little information on cancer detection or coping.

Since there appears to be so little information on

breast cancer prevention and detection in the media, women might seek out information from other sources such a physicians, friends or relatives or health organizations depending on their information needs and expectations.

However, once a woman is diagnosed with breast cancer her information needs will most likely change dramatically in terms of content (i.e. treatment, coping information) as well as urgency. This will very likely affect the scope and depth of her information search.

Since the ultimate interest of this study is in primary prevention (i.e. dietary changes etc.) but even more so secondary prevention of breast cancer (i.e. increasing screening for women who are free of breast cancer), breast cancer information seeking will be assessed only in terms of information on breast cancer prevention and breast cancer detection.

The next part of the paper presents an overview of theoretical and empirical work which suggest tentative predictions about the nature of the individual relationships between each of the HBM components in the model as well as the HBM's overall ability to predict breast cancer-related information seeking.

The Health Belief Model and Breast Cancer-Related Information Seeking.

Threat perceptions

The perceived threat of an illness consists of individuals' perceived susceptibility to an illness combined with perceptions of severity of having the illness. Perceived susceptibility refers to an individual's subjective beliefs about the likelihood of getting a disease. Perceived severity pertains to an individual's subjective beliefs about the likelihood that negative consequences will be contingent to having a particular disease.

Although there are several studies which have investigated the impact of individuals' perceived threat to breast cancer on breast self examination and mammography screening, (Strauss et al. 1987; Calnan, 1984; Lerman et al., 1990; Rutledge et al., 1988; Champion, 1987; Fink & Shapiro, 1990), information seeking has only been marginally addressed in these studies. There is little empirical evidence to suggest how perceived threat to breast cancer will impact on breast cancer-related information seeking. However the assumptions made by the HBM, as well as some empirical evidence, present grounds on which to base some tentative predictions.

The HBM suggests that the greater the acceptance of the

perceived threat to a disease, the greater the motivational force to engage in preventive health behaviors (Rosenstock, 1974). Similarly, when the acceptance of the perceived threat toward a disease is low, there will be little incentive to undertake any action. In terms of information seeking it seems plausible that women with a very low perceived threat of breast cancer (i.e. women do not perceive breast cancer to be very serious and/or do not perceive themselves as very vulnerable to getting the disease) are less likely to have many urgent breast cancer information needs. In this condition it seems likely that women will not engage in many purposive health and/or information seeking behaviors which may impact on their health status in regard to cancer. Reflecting this "casual" condition individuals are not thought to be purposive in their search for cancer-related information - rather their search is accidental and aimless.

However, some women might perceive themselves at greater risk of getting breast cancer and/or are more concerned and fearful about the consequences of the disease. These women are likely to have a high perceived threat of breast cancer. Consequently these women are likely to have greater information needs in regard to breast cancer and therefore might be more active in information seeking as well as other cancer prevention health behaviors such as dietary changes, exercise, screening, etc. As a result

individuals might expand their information search to include more specialized sources such as books focusing on cancer issues, health care professionals, sources like the Cancer Information Service and individuals in their extended networks. Information needs created by the concern are believed to make these women more active information seekers as well as receivers. Although empirical evidence is scarce there is some research which suggests that information seeking/acquisition is related to a woman's perceived threat of breast cancer.

Some research shows that women who participated in a mammography screening program remembered receiving an information packet significantly more than women who refused to participate in the screening project (Rimer et al., 1989), indicating that women who engage in mammography screening might be more active "receivers" of information than their non-screening counterparts. Calnan's (1984) study showed a similar finding where women who had seen breast self-exam education leaflets were more likely to attend a breast self-exam class than women who had not seen any information about it. These women also expressed greater perceived vulnerability to breast cancer. Evans, Love, Meyerowitz, Leventhal, and Nerenz (1985) found that interest in cancer information was a significant predictor variable discriminating between individuals who did and individuals who did not seek out preventive cancer services. In this study

perceived susceptibility to cancer also contributed significantly to active participation in a Cancer Prevention Clinic. In at least one study (Rutledge et al., 1985), perceived susceptibility to breast cancer was found to be positively related to self-reported interest in cancer information, indicating that perceptions of vulnerability might be related to interest in information. Yows (1991) found that perceived threat to cancer (perceiving cancer symptoms) was a significant predictor of focused exposure to health and cancer information, indicating that perceived threat to cancer might be related to greater attention to health and/or cancer messages.

Besides perceptions of vulnerability, perceptions of seriousness have also been found to be related to information seeking /acquisition. Calnan (1984) found that women who attended a BSE class were not only more likely to have seen education leaflets and to perceive themselves as more vulnerable to breast cancer, they also expressed a greater concern about breast cancer. Yows (1991) found that worrying about getting cancer was a significant predictor of paying attention to cancer messages. Seydel, Tall, and Wiegman, (1990) found that the assesment of severity of breast cancer was a significant contributor to individuals' ordering of a leaflet on "Breast self-examination". In a study by Johnson et al. (in press) concern for getting breast cancer as well as fear for getting breast cancer were predictor

variables for cancer-related information seeking from doctors among women forty and older. In that same study fear for getting breast cancer was also a predictor variable for seeking out information from friends and family. More generally, Bishop (1974) found that anxiety (i.e., worry about cancer) was related to choice of cancer content as well as overall readership of cancer information among college students. He found that information seeking on health topics was significantly higher among groups with higher anxiety than groups with low anxiety.

Although it's not clear if these studies measure similar constructs (i.e., fear, concern, worry, anxiety, vulnerability), they all appear to pertain to some extent to an individual's perceived threat of cancer. Therefore, although there is very little direct evidence, these findings on information seeking, information acquisition and/or interest in information could in part indicate greater information needs created by a higher level of cancer threat.

Therefore it is hypothesized that:

Ho#1: Perceived threat (i.e., perceived vulnerability and severity) of breast cancer will be positively related to breast cancer-related information seeking.

Barriers and benefits of information seeking

The Health Belief Model incorporates a cost/benefit analysis of barriers to and benefits of the recommended health behavior as an important predictor of the likelihood that any recommended action will be taken. Barriers pertain to the "potential negative aspects of a particular health action", including perceptions that it may be dangerous (i.e., side-effects), unpleasant (e.g., painful, difficult, upsetting), inconvenient, time-consuming, and so forth" (Janz & Becker, 1984, p.2). Most studies on breast cancer have investigated barriers to mammography screening and/or breast self-examination. Since in this study information seeking is treated as the outcome variable, barriers and benefits to information seeking will to be assessed.

The cost/benefit analysis of the information search is also an important component in the more purely information-seeking models (Atkin, 1973, Lenz, 1984) as well as the adapted Health Information Acquisition Model (Freimuth et al., 1989). Barriers to information seeking can be many. Perceived or real lack of access to an information carrier is one important barrier to exposure (Atkin, 1973; Lenz, 1984; Freimuth et al., 1989). Several of the information carriers from which individuals can seek information differ in their level of accessibility. This might be physical (i.e., distance/time expense, knowledge about the carriers) as well as psychological (perceptions that the search will be

embarrassing, that the information obtained won't be useful or important). Yet another barrier to information seeking could be related to a woman's fear that she might actually find out information (by visiting her doctor for a consultation or screening) which she does not want to find out. Fear can play a major role in impeding cancer-related information seeking. In some cases information carriers are avoided because they increase uncertainty and thereby stimulate fear (Donohew, Helm, Cook & Shatzer, 1987; Swinehart, 1968). Therefore, fear of outcomes of the information search might be a similar impediment to cancer information seeking as fear of a positive result is to mammography screening. These barriers then, time, cost, embarrassment, lack of perceived utility of information and fear could all hamper the information search.

Perceived benefits of a recommended health action pertain to the perceptions that the perceived threat to which an individual feels subjected would be substantially reduced by taking a specific action (Rosenstock, 1988). The action which will be taken depends on the various alternatives that are available to him/her. In regard to breast cancer, one route to reducing the threat of breast cancer might be to gather more information about the disease. More specifically, benefits of breast cancer information seeking pertain to the perceptions that novel or additional information on breast cancer will reduce

uncertainty about breast cancer, increase the woman's ability to recognize changes in her breasts as well as detect breast cancer more quickly than she otherwise would. In other words, the perceived benefits of information seeking pertain to the perceptions that engaging in such actions will ultimately have a postive impact on a woman's physical and/or mental health.

The Health Belief Model suggests that when the benefits to a recommended action are perceived to outweigh the barriers, the likelihood of a person taking the recommended action is greatly increased. Therefore,

Ho#2: If perceived benefits of breast cancer-related information seeking outweigh the perceived physical and/or psychological barriers to information seeking, the cost/benefit analysis will be positively related to information seeking. If benefits to information seeking do not outweigh the barriers, the cost/benefit analysis will be negatively related to information seeking.

Health motivation

Health motivation is thought to function as a motivating factor to undertaking health-related behaviors by providing sufficient impetus (health concern) to make health issues salient or relevant (Rosenstock, 1988). This general health concern is presumed to be reflected in women's beliefs

as well as their overall repertoire of preventive health behaviors. Vernon et al.,(1990) found that general health concern was related to participation in mammography screening. Champion (1985, 1988) found that health motivation (operationalized by assessing involvement in a number of health behaviors) was an important variable in predicting frequency of breast self-examination. It seems likely that the more motivated the woman is in general to enhance her health, the more likely she is to engage in preventive health behaviors and the more vigilant she will be in seeking out information on breast cancer. Weinstein (1979) has found that lifestyle indicators such as paying special attention to diet and not smoking were positively associated with information seeking about cancer, suggesting that information seeking could be one behavior of individuals' larger repertoire of health behaviors.
Therefore,

Ho#3: Health motivation will be positively related to breast cancer-related information seeking.

Besides perceived threat to breast cancer, the cost/benefit analysis of information seeking behaviors and individuals' health motivation, there are several other components specified in the HBM which are believed to impact on the outcome variable indirectly (by impacting on the

perceived threat or the cost/benefit analysis). Given that research on HBM has generally focused on the impact of perceived threat and cost/benefit perceptions, there is much less literature to make predictions about the relationships of cues to action and modifying factors with the other components in the model.

Cues to action

Although the combination of the perceived threat and cost/benefit analysis are thought to produce the energy or force to act as well as the preferred path of action, some instigating event is believed to be necessary to set the process in motion (Rosenstock, 1974). "The required intensity of a cue that was deemed sufficient to trigger behavior presumably varied with differences in the levels of susceptibility and severity. With relatively little acceptance of susceptibility to or severity of a disease, rather intense stimuli would be needed to trigger a response. On the other hand, with relatively high levels of perceived susceptibility and severity even slight stimuli might be adequate" (Rosenstock, 1974, p. 333).

Since cues to action really pertain to a class of variables rather than one single construct, this study will only investigate the relationship of cues to action which have been found in the literature to be related to breast cancer screening behavior. Specific external cues which

could influence women's perceived threat to breast cancer are factors such as: cancer in one's social environment, i.e., having friends or relatives who have been diagnosed with cancer. When there are more personalized factors, such as a close family member who has been diagnosed, the perceived threat is likely to become greater yet. Other external cues pertain to incidental exposure to external message cues which may trigger a response. A PSA on television, an article in a magazine or a conversation with a friend or a health professional about breast cancer could all trigger a greater perceived threat to the disease. Internal cues, such as symptoms in one's breasts are also likely to influence the woman's perceived threat to breast cancer and with that might trigger action. Research suggests that both presence of symptoms and/or cancer in one's immediate social environment have been found to be related to breast cancer screening (Hobbs et al., 1990; Fox et al., 1985; Lerman et al., 1990, Fink & Shapiro, 1990; Rimer et al., 1989). However, these investigations have generally not assessed if this relationship is mediated by an increased perceived threat to breast cancer, which is the way it is incorporated in the HBM framework. The HBM posits that:

H#4: Cues to action will be positively related to perceived threat of breast cancer.

Modifying factors

Besides cues to action, another set of factors are posited to indirectly influence the outcome variable by impacting on individuals' threat perceptions and/or their cost/benefit analysis of the recommended action. As is the case with cues to action, modifying factors appear somewhat of a "catch-all" category for a variety of variables. Therefore, only variables (such as health locus of control and demographics) which have been found to be related either to breast cancer screening or information seeking are included in this study.

Health locus of control (HLOC)

Health locus of control or expectancies that one's behavior either is or is not directly related to health outcomes is included in the model as one modifying factor which affects both a woman's threat perceptions as well as her perceptions about the benefits and barriers to a specific health action. Traditionally individuals have been divided into internals or externals. "Health-external" individuals are presumed to have generalized expectancies that the factors that determine their health are ones over which they have little control (i.e., factors such as luck, fate, chance or powerful others). "Health-internals" are presumed to believe that the locus of control for health is internal and that one stays or becomes healthy or sick as a

results of his or her own behavior (Wallston & Wallston, 1981). In general, this health orientation is believed to interact with health value to produce health behaviors.

Brown (1983) found a negative correlation between chance health locus of control and health promotion activities for a sample of adult women, indicating that women who did not perceive to have control over their own health tended to engage in fewer health promotion activities than women who did perceive their health to be determined by their own actions. In a review of the literature on health beliefs and preventive health behavior Nemcek (1990b) argues that findings from a variety of studies suggest that chance locus of control is negatively correlated with a person's readiness to undertake preventive behaviors. Therefore, if a woman feels her health is determined by 1) fate or chance or 2) powerful others, it is not likely that she will perceive a great deal of benefits from any kind of health action (including information seeking). However, if she believes her health outcome is a result of her own behavior it seems likely that she will perceive greater benefits from any action (including health-related information seeking). Newcek (1990b) cites studies which have found a positive relationship between perceptions of personal control over one's health and perceptions of benefits of preventive measures.

Similarly, perceptions of control over one's health is likely to make the threat to a disease less than when one

believes fate can strike at any time. Nemcek's (1990b) review contains studies which have found a negative relationship between perceptions of personal control over one's health and perceptions of susceptibility to illness. Therefore, perceptions that health is determined by fate/chance or powerful others are likely to be positively related to threat perceptions, whereas perceptions that one's health is controlled by oneself are likely to be negatively related to threat perceptions. Therefore,

H#5: Perceptions of personal control over one's health status will be positively related to benefits of breast cancer-related information seeking.

H#5a: Perceptions of personal control over one's health status will be negatively related to threat perceptions.

H#6: Perceptions of health being determined by chance and/or powerful others will be negatively related to benefits of breast cancer-related information seeking.

H#6a: Perceptions of health being determined by chance and/or powerful others will be positively related to threat perceptions.

Demographic variables

Demographic variables in the HBM are believed to impact on individuals' perceived threat as well as perceptions of the barriers and benefits of taking a recommended health action. Although this variable is only one in the larger class of modifying factors, demographic variables are in and of themselves a class of variables rather than one single construct. Consequently these variables should not be expected to all be similarly related to the outcome variable.

Age, education and SES have all been found to be related to health beliefs as well as health behaviors such as breast self examination, mammography screening and other health behaviors (Kirscht, 1983; Hobbs et al, 1980; Rutledge et al. 1988; Mechanic & Cleary, 1980). However, it's not clear from these investigations if there is a direct relationship or if the relationship is mediated by threat perceptions and perceived cost/benefit analysis. It seems plausible that when one gets older one feels more susceptible to illness in general and to a disease such as cancer in particular. However, it is not clear how age might be related to cost/benefit perceptions of information seeking. Similarly, the relationship between education and cost/benefit analysis and threat perceptions is also not easily defined. Therefore, besides one hypothesis, several research questions will be posited for the relationships between the several demographic variables and the cost/benefit analysis and threat

perceptions.

H#7: Age will be positively related to threat perceptions.

RQ1: How is age related to the cost/benefit analysis of breast cancer-related information seeking?

RQ2: How is education related to threat perceptions?

RQ3: How is education related to the cost/benefit analysis of breast cancer-related information seeking?

Testing the Health Belief Model

Although some research has been done on the comparative value of HBM with other models/theories (Seydel, Taal & Wiegman, 1990; Mullen, Hersey & Iverson, 1987; Hill, Gardner & Rassaby, 1985; Cohen, 1984), these studies have produced results which are difficult to interpret since 1) the HBM model has been compared with a variety of different theories or models (i.e., Theory of Reasoned Action and Subjective Probability Model (Hill et al., 1985), Theory of Reasoned Action and the PRECEDE model (Mullen et al., 1987) and Protection Motivation Theory (Seydel et al., 1990), and 2) only the four main components of the HBM have been investigated. These studies, as with most other studies which have relied on the HBM for their theoretical foundation, have

only assessed the relative importance of the four main components in the model (i.e., perceived susceptibility, perceived severity, perceived barriers and perceived benefits) on the dependent variable using multiple regression or discriminant analysis.

Although the HBM has been used extensively, most research has not incorporated a test of the complete, overall model as such (Rosenstock, 1990) but has rather focused on specific paths. Seibold and Roper (1974) claim that "the relationships among these variables have never been formalized, especially potential interactions..." (p. 629). Besides potential interactions, another neglected aspect of the HBM is the causal nature of the relationships implied by the model. Although Chen and Land (1986) have investigated causal relationships among Health Belief Model variables, their study is limited to the investigation of causal relationships between health beliefs and health behaviors.

The neglect of investigations of causal relationships among HBM components might be partly caused by the fact the some of the latent variables in the HBM such as modifying factors and cues to action are <u>classes</u> of variables rather than single constructs. This makes a pure test of the HBM more difficult if not impossible. However, a test of the model as a whole using path analysis might not only be able to shed light on the specified relationships in the model, it can also aid in assessing the importance of the many

variables grouped under the larger classes of modifying factors and cues to action.

Therefore, the current study will include many of the other components traditionally incorporated (but not investigated) in the HBM model, such as cues to action, health motivation and modifying factors. The relationships among these variables will be assessed simultaneously, using path analysis, to present a more encompassing picture of the influence of HBM variables on the scope of women's breast cancer-related information seeking patterns.

This study will not only present a more encompassing test of the HBM than has been conducted to date, but the current study will also assess if the relationships between modifying factors, cues to action and breast cancer-related information seeking are direct or indirect relationships. Additionally, the statistical methods used in this study, regression and path analysis, will aid in "streamlining" the model by suggesting which variables and relationships are the most crucial in determining information seeking about breast cancer. This might aid in reduction of variables currently grouped under the classes of variables, which may in turn aid in theory development.

The overall hypothesis for testing the model states:

H#8: The causal relationships as specified in the Health Belief Model will be able to predict intentions to seek

breast cancer-related information among adult women (See Figure 2).

Testing an Alternative Model

Although the HBM specifies certain indirect paths between modifying factors, cues to action and the outcome variable, in regards to information seeking there is also some literature which suggests an alternative model based on direct rather than indirect relationships between the cues to action, modifying factors and the outcome variable (information seeking).

Cues to action and information seeking

It is possible that cues to action might directly impact on information seeking rather than indirectly as it is hypothesized in the traditional HBM framework. Information seeking in general is believed to be triggered by a stimulus which forces the individual to assess information needs versus information possessed (Lenz, 1984). If a discrepancy is found individuals are likely to seek out information to fill the gap (Lenz, 1984; Freimuth et al., 1989). The stimulus in the Health Information Acquisition Model is believed to directly impact on health information seeking, whereas in the Health Belief Model the impact of the stimulus (cue to action) is believed to impact on the outcome variable through its impact on the perceived threat, thereby

triggering the recommended health action.

There is at least some research which suggest that "cues to action" might impact on information seeking directly. Ditto, Jemmott and Darley (1988) presented college students with a "cue to action" in the form of a placebo saliva test purportedly indicating that the individual had a fictitious enzyme deficiency that increased the likelihood of pancreatic disease. Although subjects who were exposed to the deficiency-present condition reported a lower perceived threat to the disease (presumably due to defensiveness) than subjects who were exposed to the deficiency-absent condition, the subjects in the deficiency-present condition did indicate a greater interest in obtaining information about pancreatic disease than the subjects in the deficiency-absent condition. This suggests that even though a cue to action might not always increase individuals' acceptance of the perceived threat to a disease, these "cognitive coping processes do not necessarily preclude further action-oriented coping responses such as information seeking " (Ditto et al., 1988, p. 199). Therefore, cues to action could have a positive direct effect on breast cancer-related information seeking behavior rather than an indirect effect. It is not clear from the literature if the relationship would be the same for external as well as internal cues. Therefore,

H#9 : Cues to action will be directly and positively related to breast cancer information seeking.

RQ4: Will the relationship be similar for external and internal cues?

Health locus of control and information seeking

Although HLOC could have an indirect impact on information seeking by its impact on threat perceptions and cost/benefit perceptions, it is also possible that HLOC could have a direct impact on one's health-related information seeking behavior. Wallston, Maides and Wallston (1976) found that individuals with internal health locus of control who valued health highly chose more pamphlets about a particular health condition, hyptertension, than did externals regardless of their health value. Price-Greathouse & Trice (1986) found that the "chance" dimension of the subscale of Wallston, Wallston and DeVellis's (1978) multidimensional health locus of control scale predicted subsequent health-related information seeking (i.e. attendance of an informational meeting about AIDS). This is somewhat inconsistent with the literature cited by Nemcek (1990a) which shows that chance health locus of control is negatively related to engaging in preventive health behaviors and perceptions of benefits of preventive measures.

In a review of the literature on the locus of control

contruct Wallston and Wallston (1981) describe the inconsistent findings of many studies investigating the relationship between health locus of control and information seeking. Kirscht (1983) also reports that the research on locus of control and information seeking has generally produced inconsistent results. However, since there is some reseach which suggest a small direct relationship between perceptions of personal control over one's health and information seeking the following hypothesis is posited.

H#10: Perceptions of personal control over one's health status will be positively related to breast cancer-related information seeking.

Since the literature on the relationship between perceptions of health being determined by chance or powerful others and health-related information seeking seems inconsistent a research question will be posited for these dimensions.

RQ5: How are perceptions that health is determined by chance and/or powerful others related to breast cancer-related information seeking?

Demographic variables

Although the HBM suggests that demographic variables tend to impact on the outcome variable by impacting on

threat perceptions and cost/benefit perceptions, there is also some literature which suggest that demographic variables can directly impact on individual's information seeking patterns.

Past research has shown that people's use of the various information carriers (such as CIS) for health related information varies by age, sex, education, race, and occupation (Freimuth et al. 1989; Wilkinson & Wilson, 1983) although typically these factors account for low proportions of the variance in information seeking (Lenz, 1984). Age has been found to relate negatively to information seeking (Lenz, 1984). Johnson et al. (in press), found that age was a significant variable for discriminating cancer information seekers from non-seekers for information from friends and family and combined channels among women forthy years and older. Group mean differences showed that non-seekers appeared older than seekers.
Therefore,

H#11: Age will be negatively related to breast cancer-related information seeking.

Johnson et al., (in press) found that education was not a significant predictor variable of information seeking among older women. Since there is not enough research on which to base predictions in regard to education, a research question

will be posited in terms of the impact of education on breast cancer-related information seeking.

RQ6: How is education related to breast cancer-related information seeking?

Although this study is an attempt to test the heuristic value of the HBM in predicting breast cancer-related information seeking among adult women, alternative paths (based on the literature on information seeking) are specified. This alternative model suggests direct relationships where HBM has specified indirect relationship. Since this alternative model is developed based on a summary of empirical research data without an overall theoretical framework, a research question will be posed rather than a hypothesis in terms of the usefulness of this alternate model.

RQ7 : Are the indirect relationships as they are specified by the Health Belief Model a better fit of the data than the direct relationships specified in the alternative model? (See Figure 2a).

Although there are currently statistical techniques such as path analysis which make it possible to assess causal relationships among variables based on correlational data,

confidence in the direction of the causal paths is enhanced by conducting either prospective studies or by finding ways to experimentally or logically establish time-ordering among the variables. Therefore, in this study, the HBM relationships will be tested on intentions to seek breast cancer-related information from a variety of information carriers rather than actual (retrospectively reported) behavior as the dependent variable. Although there is a controversy in the literature on the relationship between intentions and actual behaviors, Fishbein & Ajzen (1981) have argued and empirically supported the notion that increased specificity of intentions will increase the likelihood that intentions predict future behaviors. In the current study, respondents will be asked about their intentions in terms of a specific time period (in the next year), about a specific topic (prevention and detection information about breast cancer) from specific information carriers (physicians/health professionals, friends/relatives, health organizations, television and magazines).

To further our understanding of the antecedent variables which predict health-related information seeking, the current study will test the ability of the Health Belief Model to predict breast cancer-related information seeking intentions among a sample of adult women.

CHAPTER TWO

METHODS

Subjects

To test the HBM model in terms of its ability to predict breast cancer-related information seeking behaviors among women, a general population sample (N=317) of women 18 and over was drawn randomly from a medium-sized midwestern city with add-a-digit dialing (Lavrakas, 1987). The respondents may be characterized as follows: mean age of 41, with a range from 18 to 76; 93.3 percent of respondents were caucasions, 4 percent African-American, 2.7 percent Hispanic, American Indian, Asian or other; 2.7 percent of respondents had less than a high school education, 24 percent were high school graduates, 36.7 percent had received some college, 18.7 percent a college degree and 18 percent had some education beyond college. The respondent refusal rate for the sample was 32% and the overall refusal rate was 37% (on the basis of formulas developed by Lavrakas, 1987).

The demographic profile of this sample points to some limitations of the current study. First, it focused on adult women, a group perhaps most interested in health issues. Secondly, the sampling procedure used here may have resulted in an under-representation of disadvantaged groups. Therefore, the results need to be replicated on a more

general population including both genders.

The respondent refusal rate of 32% for this study was relatively high (34%) compared to some other surveys that have been conducted in this same topic area (Johnson & Meischke, 1991a,b). Differences with those particular surveys were the age of the target population and contextual factors. The current study surveyed a sample of adult women over 18 from the general population whereas the studies conducted by Johnson and Meischke, (1991a,b), surveyed adult women over 40 and/or women who had had a mammography in the recent past. This relatively high refusal rate in the current study may have resulted in self selection of women who had a greater interest in breast cancer than the general population which limits the generalizability of the findings of this study. However, this may be more of a problem for interpretation of the "pragmatic" results of this study than the path analysis, since that part of the study was more concerned with testing relationships among variables than with estimation of population characteristics (Lavrakas, 1987).

Procedure

The telephone interviews used in this study were conducted with CATI equipment. To insure quality, the interviewers (all female) received six hours of training by project staff. A supervisor was present at all times and

periodically monitored telephone calls while the interviews were conducted. The survey instrument was pretested using these same procedures on roughly 10% of the projected sample.

Instrumentation

Intentions to seek breast cancer-related information

To assess the scope of respondents' information seeking intentions, respondents were asked how likely they would be (on a 10 point scale) to seek breast cancer-related information (detection as well as prevention) from five different information carriers in the next year: doctors or health professionals, friends or relatives, health organizations (such as NCI and ACS), television and magazines.[1]

Measuring HBM components

The questions measuring perceived susceptibility to breast cancer, perceived severity of breast cancer, perceived benefits of breast cancer information seeking and perceived barriers to breast cancer information seeking, were based on items used by other researchers (Stillman

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[1] The operationalization of the scope of information seeking was partly based on Rakowski et al.'s 1990 definition of information seeking. Rakowski et al. defined information seeking as "a tendency to find out about health from sources such as television, radio, printed material, friends/family, health professionals and systematic personal observation.

1977; Champion, 1984) as well as newly developed scale items. To establish content validity of newly developed items, all items were put on a questionnaire, in random order, and distributed among six judges for evaluation. These six judges (all trained professionals) were asked to "fit" each of the items in one of the three categories, based on conceptual definitions given to them. (For exact descriptions see Appendix A). The questions for which there was category agreement for at least five of the six judges were included in the questionnaire. All questions were phrased as statements with which respondents were asked to agree or disagree on a 10-point Likert-type scale. For a copy of the actual survey instrument see Appendix B.

Perceived susceptibility to breast cancer

An eleven-item scale assessed women's general vulnerability to breast cancer, ("It is highly unlikely that I will get breast cancer within the next five years", "My chances of ever getting breast cancer are slim", "It is not very likely I will develop breast cancer during my life time") their comparative risk assessment ("I am more likely to get breast cancer than most other women", "It is more likely that I will get some other illness than breast cancer" (*)[2] , "I have many risk factors related to breast cancer") and their

[2] (*) indicates that these questions were dropped from the overall scale based on the results of the confirmatory factor analysis.

perceptions of environmental and life-style factors which would put them at a higher risk of getting breast cancer ("My environment makes me more vulnerable to getting breast cancer" (*), "My life-style puts me at risk of getting breast cancer" (*), "I am not old enough to get breast cancer" (*)). Two questions assessed women's perceived vulnerability to getting breast cancer at an early versus a late stage ("If I got breast cancer it would most likely be discovered before it had spread", "It is very likely that if I were diagnosed with breast cancer, it would be at a very early stage"). These latter questions were included based on Champion's (1987) argument that, since the HBM presupposes that susceptibility may be decreased by taking a preventive health action, questions measuring susceptibility to breast cancer need to include questions about vulnerability to detection of this disease at an early versus late stage.

Perceived severity

A twelve-item scale assessed women's beliefs about the severity of having breast cancer. Questions assessed perceptions about how seriously breast cancer would affect respondents' health ("Breast cancer would seriously affect my overall health", level of discomfort ("Breast cancer would be a painful experience" (*)), physical appearance ("Breast cancer is likely to result in a disfiguring physical appearance"), finances ("If I got breast cancer this would

have a serious impact on my finances" (*)), and their life as a whole ("If I got breast cancer my whole life would change", "If I got breast cancer it would devastate me"). Three questions assessed overall evaluations of breast cancer in terms of how hopeless, terminal and deadly this disease is ("Breast cancer is a hopeless disease", "Breast cancer is always a terminal disease", "Having breast cancer would result in an early death" (*)). Three other questions assessed the affective response to the thought of getting breast cancer ("The thought of getting breast cancer terrifies me", "I worry a lot about getting breast cancer" (*), "I am very afraid of getting breast cancer" (*))

Barriers and benefits to information seeking

Eleven questions assessed perceived barriers to breast cancer information seeking, including, fear of outcomes ("I am afraid to find out more about breast cancer" (*)), cost ("It would cost too much money to find out whether or not I have breast cancer"), embarrassment ("I am afraid someone will think I am asking dumb questions" (*)), time ("I do not have the time to get more information about breast cancer" (*)), lack of desire for information ("I know all I want to know about breast cancer" (*), "There are other things more important than finding out more about breast cancer" (*), "My doctor will tell me all I need to know about breast cancer" (*), "I am not interested in learning more about breast

cancer", "What I don't know about breast cancer, won't hurt me") and lack of perceived utility of information in reducing the perceived threat to breast cancer ("Knowing more about breast cancer won't help me in preventing it", "I don't think I can get information I could use on breast cancer").

Five questions assessed perceived benefits to breast cancer-related information seeking by asking women if and/or how well information about breast cancer would help them in preventing and/or detecting breast cancer at an early stage ("I will be better able to deal with breast cancer if I am informed about the disease" (*), "Information on how to prevent breast cancer can help to decrease my chance of ever getting breast cancer" (*), "Information on how to detect breast cancer will help to increase my chances of finding cancer at a very early stage", "I have a lot to gain by finding out more about breast cancer", "Information on how to detect breast cancer will help me in recognizing changes in my breast").

Health motivation

Health concern was measured with two indicants asking women on a 10 point scale how often they think about their health and how concerned they are about their health. Besides general health concern respondents were also queried about actual preventive health behaviors. Respondents were asked if they had had a cervical smear and dental checkup in

the last year. They were also asked if they had ever had a physical breast exam, a mammography and if they had done a breast self-examination in the past month. A health behavior index was formed by adding the number of different behaviors women reported to have engaged in.

Cues to action

Cancer in one's social environment was measured by six separate questions asking the respondent if she had a parent, sibling, spouse/significant other, child, relative or close friend with cancer. Scores on each question were added to form a cancer in one's social environment index. Personal experience with a cancer scare was assessed by asking respondents if they had ever 1) experienced unusual changes in their breasts, 2) experienced unusual changes which they thought might be symptoms of cancer and 3) felt concerned about changes in their breasts.

Respondents were also asked if they had ever sought a doctor's opinion on whether or not they had cancer. If respondents answered affirmative they were asked what the results were. Women who responded they were diagnosed with breast cancer were excluded from the analysis. [3]

For exposure to external message cues, respondents were

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[3] Although prior contact with the disease is incorporated in the HBM as a potential modifying factor, it was decided to exclude women who had or had had breast cancer from the survey for ethical reasons.

asked if they could recall 1) any television program or PSA, 2) article or advertisement dealing with breast cancer as well as 3) a conversation they had with a friend or 4) a health professional about breast cancer. An index was formed by adding the scores on the four questions.

Modifying factors

Health locus of control

The health locus of control scale used in this study was a nine-item scale. The items closely resembled Wallston et al., (1978) multidimensional health locus of control scale, addressing the the degree to which health is believed to be a function of powerful others such as physicians and other health professionals ("If I become ill, the best thing I can do is to be under the care of a physician", "I rely on medical professionals to prevent illness", "I will not consider self-treatment methods without the approval of my doctor"), the extent to which chance or fate controls health outcomes ("I believe that fate determines whether or not I am healthy", "If I have continued good health it is largely a matter of good fortune", "If it is meant to be I will stay healthy" (*), and expectancies concerning the ability to personally control these outcomes ("I determine how healthy I am by the things I do", "What happens to my health is my own doing", "My ill health is usually the result of my own carelessness").

Demographics

Respondents were asked about their education and age.

Although most of the variables in the current study were measured by multiple measures, some of the indexes used in this study (such as the health behavior index or most of the "cues to action" indexes) were really one-item measures. While the behaviors incorporated in the indexes may not be substantially correlated, women who engage in many of these behaviors are likely to be different in systematic ways from those who engage in only a few. However, these one-item measures could have attenuated correlations as well as inflated/or attenuated the beta weights in the regression analysis.

CHAPTER THREE

ANALYSIS

The analysis consisted of a three-step process. First, the adequacy of the measurement instruments was assessed using confirmatory factor analysis (see Fink & Monge, 1985; Hunter & Gerbing, 1982). This analytical technique requires the a priori specification of items expected to cluster together to measure the same concept. The adequacy of the proposed factors was assessed by considering 1) the homogeneity of item content, 2) the extent to which the items within each factor were internally consistent, and 3) the extent to which the items in each factor satisfied the parallelism test with items in other factors. (Hunter & Gerbing, 1982).

Content homogeneity, is similar to a check for face validity. In this sense it refers to the extent to which all the items in a factor are substantively similar to one another.

Internal consistency refers to the extent to which individual's response to one item is similar to his or her response to all other items in a factor. Hunter (1980) demonstrated that items within a unidimensional cluster will form a Spearman matrix. A matrix of predicted correlations from factor loadings (using the Spearman product rule) can be computed and compared to the correlations which are

observed in the data. If the factor is internally consistent, observed correlations will not differ significantly from those predicted by the Spearman formula.

Paralellism pertains to the concept that if two items measure a similar construct, they should have the same correlation with any outside variable (Hunter, 1980). The test for parallelism is analogous to the Spearman product rule test. Using the Spearman product rule, one can compute a predicted matrix of correlations between items of two different clusters. Comparison of the predicted matrix with the observed correlation matrix reveals significant deviations from parallelism.

For scales which were found to be both internally consistent and parallel, coefficient alphas were computed.

Secondly , following the confirmation of measurement models, relationships among the concepts were explored with multiple regression techniques. Data and residual plots were inspected to investigate non-linearity or problems with outliers. Correlations, means, standard deviations and tests for skewness and kurtosis were used to assess potential problems with multi-collinearity, restriction of range and skewness of the data. Multiple regression analyses were conducted for uncorrected correlations as well as correlations corrected for measurement error. Pedhazur (1982) states that measurement errors in the dependent variable do not lead to bias in the estimation of the regression coefficient but do

lead to an increase in the standard error of estimate, thereby weakening the test of statistical significance. However, measurement error in independent variables when more than one independent variable is used can both under as well as overestimate regression coefficients, thereby clouding the results (Pedhazur, 1982). Since corrections for attenuation create other problems, in that it precludes tests of significance of regression coefficients in the usual way (Pedhazur, 1982) regression analyses were run for both uncorrected as well as corrected correlations.

The results of these analyses were used to assess which variables should be excluded from the model(s). Variables were deleted from the regression, one at the time, based on their beta weights (i.e. if beta weights were not significant at the .05 level). Variables with statistically significant beta weights were kept in the analysis. Consequently path models were proposed and tested with PACKAGE, using least square estimation procedures and correlations corrected for attenuation due to measurement error (Hunter & Lim, 1986).

Third, the models were tested with <u>path analysis</u>. Hunter and Gerbing (1982) describe path analysis as "a procedure for systematically combining the use of partial and multiple correlation to study the causal relations among a set of variables" (p. 290). With this procedure, (if a model is recursive and if all the relations between variables in the

model are linear), each arrow in the model can be associated with a number called "path coefficient." Every correlation between variables in the path diagram can then be predicted from a set of path coefficients (Hunter & Gerbing, 1982). The overall "fit" of the model is tested by chi-square statistic.[4]

Determining the "superior" model was based on the following criteria. The first criterion pertains to the fact that the overall chi-square statistic (which tests the overall fit of the model) should be non-significant (at the .05 level). A significant chi-square means that the null hypothesis should be rejected. When testing causal models the null hypothesis refers to the model which is posited to be the "right" model. Therefore, rejection of the null hypothesis means to reject the model. In essence, the smaller the sum of squared error associated with the chi-square statistic, the better the fit of the overall model. The second criterion pertains to the "fit" of the individual paths. Although sometimes a non-significant chi-square can suggest a good fit of a model, individual paths need to be investigated. The observed correlations between two variables in the model should not deviate from the predicted

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[4] Although a more conventional procedure for model testing is the use of LISREL, that technique has certain disadvantages over the technique used in the current study. The full information likelihood method of LISREL tends to spread the error over the entire model, thereby obscuring the location of the error (Gerbing & Hunter, 1981). Separately analyzing the measurement and causal models localizes the errors.

correlations (based on the structural equations) to a greater extent than what can be expected by chance. If the deviations are larger than what would be expected by chance alone, the individual path is a poor fit. The third criterion pertains to parsimony. When path coefficients are relatively small (compared to the other path coefficients in the model or to what might be expected based on the literature), they should be omitted even if the path coefficients are statistically significant. Fourth, the model which explains most of the variance (i.e. which R- square is largest for the dependent variable, information seeking intentions) is superior over models which explain less of the variance.

In conclusion, a superior model is a model which has the lowest sum of squared error associated with the chi-square statistic, which does not include observed correlations that deviate from the predicted correlations beyond random chance, which has relatively large path coefficients, and which can explain the most of the variance with the fewest variables.

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CHAPTER FOUR

RESULTS

Confirmatory Factor Analyses. The internal consistency of all measures was assessed using the criteria discussed by Hunter and Gerbing (1982). Factor loadings and coefficient alphas were computed for all internally consistent scales.[5] The results of these analyses are presented in Table 1.

Insert Table 1 About Here

As Table 1 indicates, most scales lost some items prior to being confirmed. Items were dropped when they did not fit the Spearman Brown product rule for internal consistency, when they correlated too highly or not highly enough with items of other scales, or when they appeared to be very weak items (i.e. when the item lowered the reliability of the overall scale). As Table 1 shows, three dimensions were confirmed for the perceived susceptibility scale. One dimension pertained to women's general vulnerability to breast cancer (alpha = .69), the second dimension pertained to women's comparative risk assessment (alpha = .72) and the third dimension pertained to women's vulnerability to late

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[5] Only scales of four items or more could be tested for internal consistency due to the problem of under (or just) identification. Scales with three items of less were tested only for parallelism with other factors.

diagnosis (alpha = .70). Items dealing with risk factors (i.e., life-style, environmental or other risk factors) appeared weak indicators and were consequently dropped from the overall scale.

Two dimensions were confirmed for perceived severity. One dimension pertained to women's perceptions of breast cancer as a "killer" disease (alpha = .80), the other dimension pertained to the non-lethal consequences of breast cancer (alpha = .78). This latter dimension also included several questions measuring affective responses to the disease.

Three dimensions were confirmed for the health locus of control scale. Three items were confirmed for perceived personal control over one's health (alpha = .61), two items for the perceptions of health determined by fate (alpha = .80), and three items for health determined by powerful others (alpha = .66).

Five items of the proposed barriers to breast cancer information seeking were retained (alpha = .66) and three items of the proposed benefits of breast cancer information seeking scale were confirmed (alpha = .83). An overall cost/benefit analysis score was computed by subtracting individual's average barrier score from their average benefits score. An "average" reliability coefficient was

computed (see Guilford, 1954, p. 394). [6] The "average" reliability coefficient was (alpha = .72).

The personal cancer scare scale was confirmed (alpha = .82).

One dimension for health motivation was confirmed, dealing with general health concern (i.e. thinking about and being concerned about health) (alpha = .73).

Four of the five items on the information seeking intention scale were confirmed (alpha = .70). The question on the likelihood of seeking breast cancer-related information from a physician or other health professional in the next year did not appear to hang together with the other items in the scale. Therefore, this item was treated separately from the overall information seeking intention scale as an indicant of women's intentions to seek breast cancer related information from authoritative interpersonal information carriers. The four-item scale including intentions to seek information from friends/family, health organizations, television and magazines was labeled intentions to engage in generalized information seeking.

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[6] $rdd = \frac{rjj + rkk - 2(rjk)}{2(1-rjk)}$, where rdd refers to the overall reliability coefficient, rjj pertains to the reliability coefficient of the benefit scale, rkk pertains to the reliability coefficient of the barrier scale and rjk pertains to the correlation between the two scales (r=.18).

Descriptive Statistics

Means and standard deviations for the confirmed scales and the indexes are presented in Table 3.[7]

As Table 3 shows, the women in this sample reported they felt fairly vulnerable to getting breast cancer at some point in their life (mean of 6.4). They did however not perceive themselves at greater risk than other women (mean of 3.8) or at high risk of being diagnosed with cancer at a relatively late stage (mean of 4.3). Respondents had a higher score on their perceptions of the non-lethal consequences of breast cancer (mean of 5.3) than on the lethal consequences of breast cancer (mean of 2.1).

Respondents reported very few barriers to breast cancer-related information seeking (mean of 1.9) and many benefits to information seeking (9.2).

Respondents reported to be generally concerned about their own health (mean of 6.9). They reported to believe that their health is to a great extent determined by powerful others (mean of 7.3), and to feel that they were able to control their health to some extent (mean of 6.5). Respondents did not report to feel that their health was determined by fate or chance (mean of 3.0).

Intentions to seek breast cancer-related information from authoritative interpersonal information carriers (such

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[7] The means and standard deviations for all questionnaire items are presented in Table 2.

as physicians and other health professionals) in the next year was much higher (mean of 6.6) than intentions to engage in more general information seeking (mean of 2.8).

Maybe due to the relatively young age of the sample, respondents did not appear to experience a great deal of cancer in their social environment (mean of 1.8 on a 6pt scale). They did however report to have been exposed to many external message cues about breast cancer (mean of 3.2 on 4 pt scale). The women in this sample reported very little personal experience with cancer (mean of .3 on 3 pt scale) but to have engaged in many preventive health behaviors (mean of 3.8 on 5 pt scale).

Correlational Analyses

Results of the zero order correlations (see Table 4) show that H#1 through H#7 were fully or partially supported.

Table 4 About Here

Due to the large number of variables encompassed under each hypothesis, an outline of findings will be presented for each of the hypotheses along with a description of the findings. The first three hypotheses predicted positive relationships between threat perceptions, cost/benefit analysis, and health motivation with intentions to seek breast cancer-related information. Results for each of these

hypotheses are presented below.

Intentions to Seek Breast Cancer-Related Information From:

	Doctors		Other sources	
	r	p <.01	r	p <.01
Threat perceptions				
General vulnerability	.14	sig	.10	ns
Comparative risk	.13	ns	.10	ns
Late diagnosis	-.06	ns	.06	ns
Severity (killer)	-.02	ns	.25	sig
Severity (non-lethal)	.06	ns	.28	sig
Cost/Benefit analysis	.19	sig	.14	sig
Health Motivation				
Health concern	.15	sig	.23	sig
Health behaviors	.28	sig	-.04	ns

N = 266

Of the perceived threat dimensions only general vulnerability to breast cancer was found to be a significant predictor of intentions to seek information from doctors (or authoritative interpersonal information carriers). Although only 1 out of the 5 threat perception dimensions was found to be significant, the direction of the relationship was as predicted. General vulnerability to breast cancer was found to be positively related to intentions to seek information from authoritative interpersonal information carriers ($r = .14$, $p < .01$). For intentions to engage in generalized information seeking (other sources), only the severity dimensions of the threat perceptions were found to be significant predictor variables. Again, the direction of the

relationships was as predicted ($r = .28$, $p < .01$ for non-lethal consequences and $r = .25$, $p < .01$ for lethal consequences). Therefore, although not all the dimensions of threat perceptions were found to be significant predictor variables, the dimensions which were significant showed support for the relationship hypothesized in H#1.

For cost/benefit analysis, the sample in this study saw a great deal more benefits than barriers to information seeking behavior. Therefore it was hypothesized (see H#2) that cost/benefit analysis would be positively related to intentions to seek information about breast cancer.

This hypothesis was supported for intentions to seek information from authoritative interpersonal information carriers ($r = .19$, $p < .01$) as well as intentions to engage in generalized information seeking ($r = .14$, $p > .01$).

For health motivation, health behaviors were found to be positively related to intentions to seek information from authoritative interpersonal information carriers ($r = .28$, $p < 01$), but not related to intentions to engage in general breast cancer-related information seeking. General health concern appeared to be positively related to intentions to seek information from authoritative interpersonal information carriers ($r = .15$, $p < .01$) as well as to intentions to engage in generalized information seeking ($r = .23$, $p < .01$) showing partial support for H#3.

Hypothesis #4 predicted a positive relationship between

cues to action (i.e., cancer in one's immediate social environment, personal cancer scare and incidental exposure to external message cues) and perceptions of vulnerability and severity of breast cancer. The results show partial support for this relationship.

Perceptions of Vulnerability

	General vulnerability		Comparative Risk assessment		Late Diagnosis	
	r	p <.01	r	p <.01	r	p <.10
Cancer in environment	.15	sig	.26	sig	-.09	ns
Personal cancer scare	.13	ns	.18	sig	-.01	ns
External cues	-.04	ns	-.07	ns	-.02	ns

N=266

Perceptions of Severity

	Lethal consequences		Non-lethal consequences	
	r	p <.01	r	p <.01
Cancer in environment	-.07	ns	.03	ns
Personal cancer scare	-.09	ns	-.03	ns
External cues	-.16	sig	.00	sig

N=266

Of the cues to action, personal cancer scare (internal cue) was found to only be significantly related to comparative risk assessments ($r = .18$, $p < .01$). Cancer in one's social environment (external cue) was found to be positively related to general perceived vulnerability to

breast cancer ($r = .15$, $p < .01$) and to comparative risk assessment ($r = .26$, $p < .01$), showing partial support for H#4. Exposure to message cues (external cue) was not found to be a statistically significant predictor of perceptions of vulnerability. For severity perceptions, only exposure to external message cues appeared to be a statistically significant predictor of perceptions of severity of breast cancer. This variable was found to be negatively related ($r = -.16$, $p < .01$) to severity perceptions, contrary to predictions.

Hypothesis #5 and #5a predicted a positive relationship between perceptions of personal control (control) over one's health status and perceived benefits of breast cancer-related information seeking and a negative relationship between personal control and threat perceptions. For the relationships between perceptions of health status being determined by chance (chance) or powerful others (others) and cost/benefit analysis and threat perceptions the predicted relationships (H#6 and H#6a) were just the oppposite.

Of the demographic variables, age was predicted to be positively related to threat perceptions (H#7). Three research questions (RQ1, RQ2, RQ3) queried the relationships between age and cost/benefit analysis, education and threat perceptions and education and cost/benefit analysis. The results (zero-order correlations) for these hypotheses and research questions are presented below.

Perceptions of Vulnerability and Cost/benefit analysis

	General vulnerability		Comparative Risk		Late Diagnosis		Cost/ Benefit	
	r	p <.01	r	p <.01	r	p <.10	r	p <.10
Control	-.12	ns	-.02	ns	-.15	sig	.13	ns
Chance	-.18	sig	-.02	ns	-.11	ns	-.31	sig
Others	-.02	ns	.09	ns	-.05	ns	.21	sig
Age	-.12	ns	-.13	ns	-.21	sig	-.10	ns
Education	-.04	ns	.04	ns	.02	ns	.09	ns

N=266

Perceptions of Severity and Cost/benefit analysis

	Lethal consequences		Non-lethal consequences	
	r	p <.01	r	p <.01
Control	.04	ns	.02	ns
Chance	.35	sig	.29	sig
Others	-.04	ns	.11	ns
Age	-.07	ns	-.22	sig
Education	-.09	ns	-.05	ns

N=266

Of the HLOC dimensions, perceptions of health being under one's own control were found to be negatively related to all the susceptibility dimensions although only one out of the three correlations attained statistical significance at the .01 level, for susceptibility to late diagnosis ($r = -.15$, $p < .01$). However, this dimension was not found to be a significant predictor of perceptions of severity of breast cancer. This HLOC dimension was found to be positively, albeit not significantly related to cost/benefit analysis ($r = .13$, $p < .10$), partially supporting H#5.

Perceptions of health status being determined by fate was found to be negatively related to vulnerability

perceptions (r = -.18, p <.01 for general vulnerability). This dimension was positively and significantly related to severity perceptions (r = .35, p <.01) for lethal consequences and (r = .29, p <.01) for non-lethal consequences. This dimension appeared to be negatively related to cost/benefit analysis (r = -.31, p <.01).

Perceptions of health being determined by powerful others was not significantly related to any of the threat perceptions. In contrast with H#6, perceptions of health being determined by powerful others was found to be positively related to cost/benefit analysis (r = .21, p <.01).

Age was found to be generally negatively related to perceptions of vulnerability, although not always significantly (r = -.12, ns) for general vulnerability,(r = -.13, ns) for comparative risk assessment and (r = -.21, p <.01) for vulnerability to late diagnosis. Age was also found to be negatively related to perceptions of severity (r = -.07, ns) for lethal consequences and (r = -.22, p <.01 for non-lethal consequences). These results contradict what was hypothesized in H#7. Age was also found to be negatively (although not significantly) related to cost/benefit analysis (r = -.10, ns), suggesting a tentative answer to RQ1.

Education was not a statistically significant predictor variable at .01 or .05 level for threat perceptions or cost/benefit analysis, therefore not providing any answers to RQ2 or RQ3.

In conclusion, many of the relationships hypothesized among the variables in the model were supported in terms of the specified direction. However, many of the variables grouped under the larger classes of variables did not have any statistically signficant impact at all.

Regression Analyses. The correlations among all the scales/indexes as well as the correlations corrected for attentuation, are presented in Table 4. The correlations were generally low and did not indicate serious problems with multicollinearity. These correlations (both uncorrected and corrected correlations) were used as input for multiple regression analyses.

Data and residual plots showed that none of the scales deviated dramatically from linearity with the dependent variable(s). Although a total of five outliers were spotted, exclusion of them in the analysis did not change results dramatically. Therefore it was decided to keep them in the analyses.[8]

[8] Distributions of some of the variables showed a great deal of skewness such as for cost/benefit analysis (-2.5), intentions to engage in generalized information seeking (1.1) and perceptions of severity in terms of the lethal consequences of breast cancer (2.2).

Assessing the relationships specified in the Health Belief Model.

To test H#8, multiple regression analyses were conducted to select the statistically signficant predictor variables for each of the dependent variables (endogenous variables) specified in the HBM. In order to test the indirect relationships specified in the original Health Belief Model, modifying factors and cues to action were entered as predictor variables for the intermediate variables (i.e. perceived threat and cost/benefit analysis) rather than for information seeking intentions directly. Perceived threat dimensions, cost/benefit analysis and health motivation (including the health behavior index) were entered as predictor variables for intentions to seek information directly. All variables were entered at the same time and variables with the lowest standardized beta weights were removed from the analysis one by one. Once all the variables in the equation were found to have statistically significant beta weights, no more variables were deleted from the equation.

Results from regression analyses for the uncorrected as well as corrected correlations are presented in Tables 5 through 10. Although the overall Multiple-R and beta-weights for the regression analyses based on corrected correlations were greater than those for the uncorrected correlations, the

patterns were similar.

Table 5 indicates that general vulnerability to breast cancer (beta = .17), cost benefit analysis (i.e. the barrier score subtracted from the benefits score) (beta = .12), and health behaviors (beta = .26) were significant predictors of intentions to seek breast cancer information from authoritative interpersonal information carriers. For intentions to engage in generalized information seeking, perceived severity of breast cancer (beta = .24; beta = .20), cost benefit analysis (beta = .18) and health concern (beta = .12) were significant predictor variables (See Table 5a).

Table 6 shows that for perceived general vulnerability to breast cancer, personal cancer scare (beta = .13), perceptions of personal control over one's health (beta = -.14), perceptions of health determined by fate (beta = -.17), age (beta = -.17) and cancer in one's social environment (beta = .20) were significant predictors. Table 7 shows that for perceived severity of breast cancer in terms of non-lethal consequences, perceptions that health is determined by fate (beta = .29), age (beta = -.21) and perceptions that health is determined by powerful others (beta = .11) were significant predictor variables. External message cues (beta = -.12) and perceptions of health as a matter of fate (beta = .30) were found to be significant predictor variables for perceived severity of breast cancer in terms of its lethal consequences (see Table 7a).

Table 8 shows that age (beta = -.12), perceptions that health is determined by fate (-.31) and by powerful others (beta = .26) appeared significant predictors of cost benefit analysis of information seeking. For the regression analyses based on correlations corrected for measurement error, education also appeared a significant predictor of cost-benefit analysis (beta = .13).

Insert Tables 5,5a, 6, 7, 7a and 8 about here

Assessing the relationships specified by the Alternative Model.

To be able to compare the HBM with the alternative model which specified more direct relationships between cues to action, modifying factors and intentions to seek information, multiple regression analyses were performed to assess the direct impact of modifying factors and cues to action. All variables were entered as predictor variables on intentions to seek breast cancer-related information. A similar procedure for removing non-significant variables as was described above was used in this analysis.

Table 9 shows that of the five modifying factors and three cues to action, only external message cues (beta = .21) and perceptions of health as a matter of fate (beta = -.12) had a statistically significant regression coefficient when

their direct influence on intentions to seek information from authoritative IP information carriers was assessed. These results provide only partial support for H#9, H#10 and H#11. Since most variables were not found to have any statistically significant impact, no answers could be provided for RQ4, RQ5 and RQ6.

Furthermore, perceptions of health as a matter of fate was found to be a weak predictor, adding little to the overall regression results. Ultimately, health behavior (beta = .22) and external message cues (beta = .22) appeared the most significant predictor variables accounting for most of the variance (R-squared = .13).

Table 9 about here

For generalized information seeking (see Table 10), of the five modifying factors and three cues to action, only external message cues (beta = .12) had a statistically significant beta weight when entered as a predictor variable in the equation for intentions to engage in generalized information seeking. However, this variable appeared to be the weakest among the other variables in the regression not adding much to the overall predictive power of the analysis.[9]

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[9] Although age had a statistically significant negative zero correlation ($r = -.19$, $p < .05$) with intentions to engage in generalized information seeking, in the regression analysis did variable did not appear a significant predictor. This might be the result of its correlation with severity

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Table 10 about here

In sum, for the models testing the indirect relationships (as they are specified in the HBM), different variables appeared important for the model predicting information seeking intentions from authoritative interpersonal information carriers than for the model predicting generalized information seeking. For the model predicting intentions to seek breast cancer-related information from authoritative interpersonal information carriers, the following variables were found to be significant predictor variables of the three dependent variables. General vulnerability to breast cancer, cost/benefit analysis and, health behaviors were significant predictor variables for predicting intentions to seek information; personal cancer scare, perceptions of personal control over one's health status, perceptions of health status being determined by chance, cancer in one's immediate social environment and age were significant predictor variables for predicting general vulnerability to breast cancer; perceptions of health status being determined by chance, perceptions of health status being determined by powerful others and age appeared significant predictor variables of cost/benefit

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perceptions ($r = -.22$, $p < .05$).

analysis.

For intentions to engage in more generalized information seeking, the following variables were found to be significant predictor variables of the three dependent variables. Perceived severity (both lethal and non-lethal consequences) of breast cancer, cost/benefit analysis and health concern were significant predictor variables of intentions to engage in generalized information seeking; perceptions of health status being determined by chance, perceptions of health status being determined by powerful others, age, and exposure to external message cues were found to be significant predictor variables of severity perceptions; perceptions of health status being determined by chance, perceptions of health status being determined by powerful others and age appeared significant predictor variables of cost/benefit analysis.

For the models testing the direct effect of the cues to action and modifying factors on intentions to seek information, only exposure to external message cues appeared to have a substantial significant direct impact on intentions to seek breast cancer-related information from authoritative interpersonal information carriers.

In general, the findings of the regression analyses suggest that the variables and classes of variables which are incorporated in the HBM are not all important predictor variables for the three main dependent variables in the model.

However, no generalization can be drawn about the importance (or lack of importance) for specific variables since the regression analyses showed that different variables appeared important for the two different types of information seeking intentions.

Path Analyses. The results of the regression analyses were used as a decision rule for including variables in the hypothesized version of the adapted Health Belief Model (see Figure 2).

Based on the regression analyses variables which had very small effects, were dropped from the model(s). Of the five threat perception dimensions, two vulnerability dimensions (perceptions of vulnerability to late diagnosis and comparative risk assessment) were dropped. Of the demographic variables education was dropped.

Since the confirmatory factor analysis showed there were distinct differences between intentions to seek information from authoritative interpersonal information carriers and intentions to engage in more generalized information seeking, models were developed for both these outcome variables independently. Dropping certain variables due to their low predictive impact and assessing the HBM relationships with two different outcome variables resulted not only in a less elaborate model than is postulated by the HBM but also in the fact that a different model was

hypothesized for intentions to seek breast cancer information from authoritative information carriers than for intentions to engage in more generalized information seeking.

Testing the causal relationships specified in the Health Belief Model.

Path analyses were conducted to test the indirect effects of the modifying factors and cues to action on intentions to seek breast cancer-related information (H#8) with least squares estimation procedures for both corrected and uncorrected correlations. Tables for the two sets of information carriers are presented in Tables 12, 13 and 14. [10]

Tables 12, 13 and 14 about here

For both intentions to seek information from authoritative interpersonal information carriers as well as intentions to engage in more generalized information seeking, the relationships as they are suggested by the HBM

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[10] Uncorrected as well as corrected correlations for each of the final models discussed in the analysis are presented in Table 11. Models based on corrected correlations showed greater path coefficients but did not otherwise deviate from the models based on uncorrected correlations. The latter ones are presented in Figures 3 to 5.

appeared a poor fit of the data based on the criteria outlined earier in this paper (e.g. non-significant chi-square, no large residuals between observed and predicted correlation and parsimony). Although the chi-square statistics for the models were non-significant, they were relatively large. In addition, large residuals between observed and predicted correlations indicated a number of additional (or different paths) which could better account for the relationships among the variables. Additionally, for both models there were several weak links which did not contribute much to the explanatory power of the model.

For both models most of the changes involved paths specifying links between variables which had been treated as exogenous variables (i.e. variables whose variabililty are assumed to be determined by causes outside the causal model) such as health behaviors or health concern, which are both hypothesized to exert a direct impact on the outcome variable without being impacted upon by any variable in the model. Given these problems with the proposed model, model fitting techniques were used to drop and add links to the extent that that was theoretically defensible.

Tables 12a,12b and 12c show several revised and/or simplified models for predicting intentions to seek breast cancer-related information from authoritative interpersonal information carriers.

Tables 12a,b,c about here

Table 12a indicates that the cost-benefit analysis of information seeking did not have a strong direct effect on intentions to seek information from authoritative information carriers. Instead, cost-benefit analysis seemed to impact on health behaviors which in turn influenced intentions to seek information. Both age and perceived vulnerability also seemed to partially affect health behaviors. Personal cancer scare and perceptions of personal control over one's health were such weak predictors that they were eliminated from the model. Tables 12b and 12c present simplified versions of the "revised" model. The model described in Table 12b tests a simplified model which shows that health locus of control variables and age impact on a person's perceptions of cost/benefit analysis (and/or their health behaviors), both of which influence individuals' intentions to seek information from authoritative interpersonal information carriers. The model represented in Table 12c suggests that certain cues to action such as cancer in one's social environment, as well as demographic variables such as age influenced perceptions of vulnerability to breast cancer and/or health behaviors, which in turn influenced the individual's intentions to seek

information from authoritative interpersonal information carriers. Although both models "fit" the data (see Tables 12b and 12c), the multiple regression analyses showed that perceived vulnerability and health behaviors together were stronger predictors (Multiple R = .33 (.40 with corrected correlations) of intentions to seek information from authoritative interpersonal information carriers than cost/benefit analysis and health behaviors (Multiple R=.30), suggesting that the model depicted in Table 12c is the superior model since it explains more of the variance than the model outlined in 12b. For a diagram of the "superior" model see Figure 3.

Figure 3 about here

For the models predicting intentions to engage in generalized information seeking, the relationships as they are suggested by the traditional HBM also did not appear to be a good fit of the data (see Tables 13 and 14). For the model which incorporated severity perceptions of the non-lethal consequences (Table 13) of breast cancer, cost/benefit analysis and perceived severity seemed to (besides having an effect on the outcome variable) also have an effect on health motivation, which in turn had only a

weak relationship with information seeking intentions. Health as determined by powerful others also caused problems in this model. For the model which incorporated severity perceptions of breast cancer as a "killer" disease, (see Table 14) large deviations between obtained and estimated correlations were found between cost/benefit analysis and perceived severity, cost/benefit analysis and cues to action, and several other paths. Revised and significantly simplified models are presented in Tables 13a and 14a (for perceived severity in terms of non-lethal and lethal consequences) in which only the strongest predictor variables of each endogenous variable (i.e. variables whose variations are explained by exogenous or endogenous variables in the system) have been retained.

Tables 13a, 14a about here

Figure 4 and 4a show that perceptions of health as a matter of fate influenced both the individual's perceptions of cost/benefit analysis as well as her perceptions of severity of breast cancer. These in turn appeared to impact on intentions to engage in more generalized information seeking.

Figures 4, 4a about here

In testing H#8, how well the HBM can predict intentions to seek information about breast cancer, the results are not clear cut. Based on the regression analyses seriously trimmed down models were tested for two different outcome variables. The path analyses showed that only few of the relationships as predicted by the HBM were supported. Revised and simplified models appeared to be generally a better fit of the data than the models based on the relationships posited by the HBM.

Testing the causal relationships specified by the Alternative Model.

As mentioned previously, additional regression analyses were conducted to assess the direct effects of modifying factors and cues to action on intentions to seek information from physicians as well as intentions to engage in generalized information seeking (See Figure 2a). For intentions to seek breast cancer-related information from authoritative interpersonal information carriers, perceptions of health as a matter of fate, and external message cues were statistically significant predictors.

However, the beta weight for health as a matter of fate was so much smaller (beta = -.12) for predicting intentions to seek information than for predicting perceptions of vulnerability and cost/benefit analysis, that only the direct effect of external message cues was assessed. This variable was found not to be a statistically significant predictor of perceived vulnerability to breast cancer (as it should according to the HBM), but was found to be a statistically significant predictor of intentions to engage in generalized information seeking (beta .22). Therefore, the HBM was tested including external message cues as an independent predictor variable.

The alternative model, which differed from the HBM only in that it predicts direct instead of indirect relationships between modifying factors, cues to action and the outcome variable(s), was again a poor fit of the data according to the criteria used in the current analyses (see Table 15).

Table 15 about here

In this model the cost-benefit analysis variable showed such a weak link to the outcome variable (path coefficient of .06) that this variable was dropped from the model. In dropping this variable, other variables which had

only an effect on cost/benefit analysis were also dropped. Personal cancer scare appeared a weak variable in the model and was also dropped. A simplified model did suggest a good fit of the data (see Table 15a and Figure 5a). In this model health behaviors appeared to have an impact on both external message cues as well as on intentions to seek information from authoritative information carriers.

Table 15a and Figure 5a about here

For testing the model on intentions to engage in generalized information seeking, external message cues appeared to also be the only variable of the modifying factors and cues to action which was a statistically significant predictor. Since it was the weakest variable among the other variables in the regression, it did not seem warranted to construct a path model which differed from the (indirect effects) model only in that a weak predictor variable was added as an additional exogenous variable.

CHAPTER FIVE

IMPLICATIONS

Summary of Results

1. Hypotheses 1 through 7 were fully or partially supported. Although many of the variables or dimensions of variables did not appear statistically significant predictors of endogenous variables in the models, the direction of the relationships (i.e. positive or negative) as predicted by the HBM was supported in all but four cases (e.g. two of the HLOC dimensions, exposure to external message cues and age).

2. In testing the HBM for its ability to predict intentions to seek breast cancer-related information, different variables appeared to be statistically significant predictors for the different information seeking intentions (i.e. intentions to seek information from authoritative interpersonal information carriers versus intentions to engage in more generalized information seeking). Therefore, the HBM was tested for both these outcome variables, which resulted in very different models.

3. In regard to the overall test of the HBM, the variables and relationships specified in the traditional HBM framework, appeared generally a poor fit of the data. Simplified and revised models did appear a better fit of the data.

The biggest deviation from the relationships as they are specified in the traditional HBM was the relationship between cost/benefit analysis and the other variables in the model. It appeared that cost/benefit analysis had a greater impact on individuals' health behavior (and/or concern) than it had on information seeking.

Overall, HBM variables were able to explain a moderate amount of the variance (Multiple R = .33) for intentions to seek information from authoritative interpersonal information carriers, as well as for the models predicting intentions to engage in more generalized information seeking (Multiple R = .35 and .37).

4. In testing the difference between the HBM and the alternative model, modifying factors and cues to action were found to have their impact (if any) in an <u>indirect</u> rather than a <u>direct</u> manner on the outcome variables (as is suggested by the HBM). Only exposure to external message cues clearly had a direct rather than an indirect impact on the outcome variable.

However, the revised and simplified model of the alternative model explained slightly more of the variance (Multiple R=.39) for intentions to seek information from authoritative interpersonal information carriers, than the revised and simplified model of the HBM. This suggests that the direct impact of exposure to external message cues

improved the overall predictability over a model which treated this variable as an indirect influence.

Other findings

1. Perceptions of severity and vulnerability acted on and were acted upon differentially by other variables in the model, indicating that perceived threat may not be one latent construct.

2. Regression analyses showed that perceived susceptibility to breast cancer was a statistically significant predictor only for intentions to seek information from authoritative interpersonal information carriers, whereas perceived severity of breast cancer was a statistically significant predictor only for generalized information seeking.

3. Some of the scales used in this study lost many items during the confirmatory factor analysis and/or had fairly low reliability coefficients. Other scales showed that even with very few items, reliable and internally consistent scales could be developed.

4. Descriptive statistics discussed in Table 2 and 3 showed that respondents reported little intention to engage in generalized information seeking (mean of 2.8) and moderate intentions to engage in information seeking from physicians

and health professionals (mean of 6.6).

Based on the results of the current investigation several theoretical, methodological, and pragmatic implications emerge, which will be discussed in that order.

Theoretical Implications

The model for intentions to seek information from authoritative interpersonal information carriers differed substantially from the model for intentions to engage in more generalized information seeking in terms of variables included and relationships suggested by the analyses.

For instance, the model(s) for predicting intentions to seek information from authoritative interpersonal information carriers included perceptions of vulnerability, health behaviors and exposure to external message cues as the main predictor variables for information seeking intentions. The models predicting generalized information seeking, included cost/benefit analysis and perceptions of severity as predictor variables. This suggests that different variables are important for information seeking intentions from different information carriers. This distinction between authoritative interpersonal information carriers (such as physicians and other health professionals) and other information carriers (friends/family, organizations, media) has also been found by Johnson (1991) in a test of his CISM. This differentiation makes general comments about the

results more difficult. However, some general conclusions can be drawn in terms of the value of the HBM in predicting intentions to seeking breast cancer-related information.

HBM's ability to predict information seeking intentions

Although many of the variables incorporated in the traditional Health Belief Model did not appear to be significant predictors of breast cancer-related information seeking, several of the relationships specified in the HBM were supported by the results of the current investigation.

First of all, the direction of the relationships (i.e., negative or positive) was supported for all but four relationships under investigation. Threat perceptions, cost/benefit analysis, and health motivation were positively related to the dependent variable. Of the cues to action which had statistically significant relationships with threat perceptions, the relationships were positive but for the relationship between exposure to external message cues and severity perceptions. Of the modifying factors which had statistically significant relationships with threat perceptions and cost/benefit analysis perceptions, most of the relationships were as predicted. However, perceptions that health is determined by fate was found to be positively related to perceptions of severity (as was predicted) but negatively related to perceptions of vulnerability (against predictions), suggesting that this dimension has a more

complicated relationship with threat perceptions than the other variables in the model. Perceptions of health as determined by powerful others was positively related to cost/benefit analysis, which was against predictions. The relationships between these two dimensions and other variables in the model were somewhat inconsistent with predictions, as was the case for age. Age was found to be negatively related to both perceptions of vulnerability and severity. This suggests that, contrary to predictions, aging may make women perceive breast cancer to be less of a threat.

The third HLOC dimension, perceptions of personal control over one's health status, was one of the two variables in this study that exerted so little influence on any of the predicted variables that it was dropped from the models. This may be explained by the fact that breast cancer might still be largely perceived as a illness that strikes fairly randomly. Therefore, perceptions of control over one's health might not be a significant predictor when these questions are asked in the larger context of a disease which is still largely a matter of fate.

Secondly, as is posited in the HBM, modifying factors as well as cues to action tended to impact on the outcome variable in an <u>indirect</u> rather than a <u>direct</u> way. Only for exposure to external message cues (one of the cues to action) was the relationship found to be a direct instead of an indirect one.

However, some of the exogenous variables such as health motivation/behaviors were found to be endogenous rather than exogenous. Also, some of the variables which were hypothesized to directly influence the outcome variable (such as cost/benefit analysis) were found to better fit the data when an intervening variable (i.e. health behaviors) mediated the path (although this was only true for intentions to seek information from authoritative information carriers).

Substantively, external message cues as well as health behaviors were found to be fairly strong predictors of breast cancer-related information seeking intentions, indicating that women who regularly engage in cancer screening behaviors and/or who are active receivers of breast cancer-related information, tended to also report greater intentions to seek breast cancer-related information.

Structural variables such as age and education appeared to have no direct effect on intentions to seek information from either physicians/health professionals or other sources, once other variables were accounted for. This is consistent with other research in this area such as Hibbard & Weeks' (1987) study which showed that age and education had only a slight impact on health-related information seeking from the mass media. Van der Rijt (1991) also found that gender was a more important variable in predicting need for health information than either age or education. Yows (1991) found

that education and income did not significantly predict focused exposure to health-related information. In the current study, age was found to have an significant indirect effect by impacting on threat perceptions and health motivation variables.

Although the cost/benefit analysis of information seeking was not a very strong predictor for intentions to seek breast cancer-related information, it was a strong predictor for having engaged in other cancer screening behaviors (see Table 12b) as well as remembering external message cues (see Table 15) (which had a significant impact on intentions). Several explanations are possible for these results. First, cost/benefit analysis of information seeking might not have its predicted direct relationship but instead exert an indirect influence on information seeking. This is in contrast with most studies which have focused on predicting more purely health behaviors. In these studies barriers and benefits have generally been found to be the most important predictor variables (Janz & Becker, 1984). This could be one important distinction between predicting purely health behaviors versus predicting health-related information seeking behaviors. Secondly, the reliability for the barrier dimension of the cost/benefit analysis was rather low (alpha = .66). This may mean that other kinds of barriers to the information search may need to be investigated. Thirdly, the relationship between cost/benefit analysis and information seeking might

be mediated by other variables which were not measured in the current study. The current study suggests that health behaviors and exposure to external message cues may be some of these mediating variables. However, as is suggested by Johnson, (1991) other "information carrier" related variables such as preferences for and/or expectations of particular carriers could mediate the relationship between a cost/benefit analysis and intentions to seek information.

An argument similar to the one for cost/benefit analysis could be made for the threat perceptions. Although both perceptions of vulnerability and seriousness of breast cancer differentially influenced information seeking patterns, especially for the vulnerability dimension the impact was not very great. Again, this may in part be the result of the lack of assessment of mediating variables. For instance, based on the earlier discussion of Johnson's (1988) Information Seeking Stage model it would appear that increased vulnerability would lead to information seeking because these perceptions trigger a need for information. This potentially mediating variable was not explicitly addressed in the current study.

In terms of predicting breast-cancer related information the "revised" models have become more and more "behavioral-type" models rather than cognitive models. From this study it appears that prior health behaviors and exposure to health messages from a variety of information carriers were important

predictor variables for breast cancer-related information seeking. Moreover, when prior cancer-related information seeking behavior was incorporated in the regression analyses, the predictive value was greater yet. Although the HBM does not explicitly include previous contact with the recommended health behavior as an important variable for predicting future behavior when, in additional regression analyses, prior breast cancer-related information seeking behaviors were included, the predictive power of the models increased significantly (see Tables 16 and 17).[11]

Table 16 and 17 about here

However, since it is more difficult for health professionals to directly change individuals' behaviors, the cognitive components of the model merit more attention. The next part of the paper will outline an adapted framework for predicting breast cancer-related information seeking based on the HBM value-expectancy notion as well as the results of the current study.

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[11] Respondents were asked if they had ever actively sought out information on how to prevent breast cancer from occurring from: doctors/health professionals, friends /relatives, health organizations, television programs and magazines. Respondents were asked the same question in regard to information on how to detect breast cancer. Respondents' answers for each of the cancer content types were added to form two "prior information seeking" indexes.

Revised, suggested model for breast cancer-related information seeking.

Nature of the perceived threat

The results of the current study show that different threat perceptions were important for information seeking intentions for different information carriers. This suggests that the nature of the threat perceptions may be as important for predicting intentions to seek breast cancer- related information as the amount of threat perceived. For instance, of the threat perceptions, only perceived vulnerability to breast cancer appeared to be a signficant predictor variable for intentions to seek information from authoritative interpersonal information carriers whereas only perceived severity of breast cancer appeared to be a significant predictor variable for intentions to engage in generalized information seeking.

This suggests that the nature of the threat perceptions might instill special needs for different kinds of information which are believed to be obtainable from specific information carriers.

In light of the results of the current study it could be argued that heightened levels of vulnerability may produce information needs which demand a more rational and specific search for answers than heightened levels of perceived seriousness of the disease. The way threat perceptions have

been measured in the current study suggests that perceptions of vulnerability pertain more to perceptions of how personally involved individuals are or will be with breast cancer whereas severity perceptions (especially those pertaining to breast cancer as a "killer" disease) pertain to a more general, abstract threat rather than a close personal confrontation. Therefore, as is also suggested in Johnson's (1988) Information Seeking Stage argument, information needs based on more of an abstract general threat may not (unless one also feels highly susceptible), present a very strong impulse for a rational and specific information search, making it more likely that individuals "float" from medium to medium with changing needs depending on the satisfactions obtained. Information needs based on an anticipatory personal confrontation with a disease (particularly a life-threatening disease) may trigger a much more directed and urgent information search. In this sense the need for information would not depend on increased levels of perceived threat of the disease per se but also on the type of threat response which is experienced by the individual.

Although the type of threat perceptions as they are discussed in the Health Belief Model are largely believed to be based on cognition, more attention needs to be given to the difference between (or interaction of) affective and cognitive threat perceptions. When a disease is perceived as highly life-threatening and a personal confrontation is

anticipated the threat perceptions may become more affective in nature. In constrast, a disease which is not perceived as very life-threatening and/or is not anticipated to affect the individual (or his/her loved ones) may not induce any affective response whatsoever, resulting in a threat perceptions which are largely cognitive in nature. Either way, the nature of the threat perceived is likely to influence information needs.

Information needs

This notion of differential needs and need satisfaction is similar to the concepts underlying Uses and Gratifications theory where individuals' are believed to seek out and evaluate media performance in terms of what is wanted from a given medium or type of content. Uses and Gratifications theory suggests that individuals differentially select and use communciation vehicles to gratify felt needs and that audience motives shape media effects (Rubin, 1986). This theory further suggests that information carrier usage is a motivated behavior that performs certain functions for the users. Consequently, different information seeking patterns might emerge depending on the different needs experienced (Rubin, 1986).

The notion of "information need" is an important one in many of the communication and health communication models mentioned earlier in this paper (Atkin, 1973; Freimuth et

al., 1989: Lenz, 1984). Uses and Gratifications theory suggests that receivers select differing channels and content to fullfill felt needs (Rubin, 1986).

Although this theory's main focus is on explaining mass media exposure, the theory does include nonmedia channels as alternatives for information. These alternatives for information are generally not investigated. Some studies show that many people report consulting more than one information carrier for cancer-related information (e.g. Mettlin et al., 1980). This implies that for health-related information seeking, people turn to a variety of different information carriers to fulfill their information needs. Although access, level of urgency and evaluation of information carriers all might impact on information seeking patterns (Freimuth et al., 1989; Lenz, 1984; Atkin, 1973), the current study suggests that expectations about reduction of the specific type of threat response, might influence the information search.

In the current investigation, two of the questions measuring "barriers to information seeking" specifically addressed perceived desire for and interest in information. One question (which was dropped from the scale based on the results of the confirmatory factor analysis) asked respondents to agree/disagree with the statement:"I know all I want to know about breast cancer". Another questions (which was incorporated in the overall scale) asked respondents to agree

with the statement:"I am not interested in learning more about breast cancer". It appeared from additional correlational analyses that both questions were negatively related to perceptions of vulnerability to breast cancer (-.28, p <.05 and -.13, ns). Additionally, the question pertaining to interest was positively related to perceptions of breast cancer as a "killer" disease (.15, p <.05). Both these questions were negatively related to intentions to seek information from authoritative interpersonal information carriers (-.23 and -.18, p <.05) as well as to intentions for generalized information seeking (-.14 and -.21, p <.05).

These findings suggest that threat perceptions are not uniformly related to information needs. These results also suggest that information needs and information seeking intentions are related.

Perceived urgency

However, the two questions just discussed pertained to individuals' desire for and interest in information rather than need for information which may not be similar concepts. The findings in this study show that although women scored fairly low on the question: "I know all I want to know about breast cancer" (mean of 4.3 on a 10 point scale), and although the benefits to information seeking seemed to far outweigh the barriers, the reported intentions to seek information in the future were very low for generalized information seeking (mean

of 2.8) and a little above average for information seeking from physicians and other health professionals (mean of 6.6). This suggests that individuals may feel comfortable living with less information than they would want. This may change once the perceived want has been replaced by perceived need, when the individual perceives a real and therewith urgent need for information rather than merely a desire or interest. In Freimuth et al.'s (1989) Health Information Acquisition Model, urgency with which the information is needed is an important variable determining the scope and depth of the information search. More research needs to be conducted to investigate the progression of going from "want states" to "need states" and what antecedent factors guide people from stage to stage. Johnson's (1988) stage argument might shed more light on the process of moving from threshold to threshold of information wants and needs and subsequent information search processes. However, the stage argument needs a great deal more conceptual clarity before it can be put to an empirical test.

Cost/benefit analysis

Depending on the type of need which is being experienced an assessment is likely to be made about which information carriers are most likely (and most conveniently) able to reduce the threat response that is experienced by the individual. The weighing of costs and benefits of the search has been established as an important determinant in the

decision making processes in many decision making models, including information seeking models (Atkin, 1973; Freimuth et al., 1989, Lenz, 1984, Johnson, 1991). Scholars have argued that individuals weigh the costs against the benefits in order to make a decision about some course of action.

In the current study benefits of information seeking far outweighed any costs of the information seeking process. However, the overall cost/benefit analysis of breast-cancer information seeking was an important variable only for the model predicting intentions to engage in generalized information seeking. It appeared not to be an important variable in the model predicting intentions to seek information from authoritative interpersonal information carriers. This suggests that costs and benefits of the search may be a more important variable for the reduction of some threats such as the more abstract general threat to a disease than for the reduction of other threats such as personal confrontation with the illness.

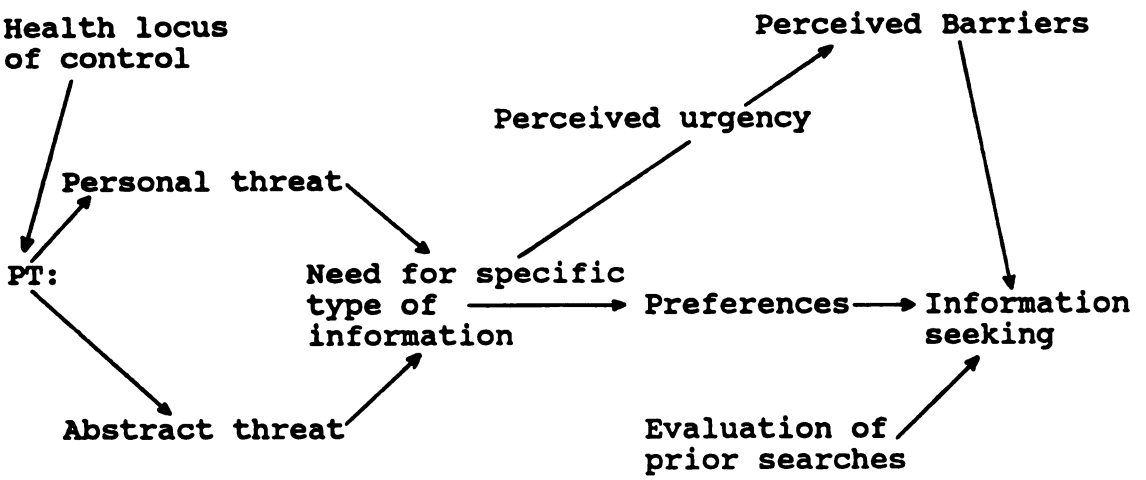
Although the current study investigated the impact of the overall cost/benefit analysis, when barriers and benefits were investigated separately some evidence for the just stated argument appeared. For instance, the data showed that perceived vulnerability was negatively, albeit not statistically significantly, related to perceived barriers ($r = -.11$). However, perceptions of breast cancer as a "killer" disease was found to be positively related to perceived

barriers ($r = .27$, $p < .001$). This suggest that type of threat might be related to perceptions of barriers. No statistically significant correlations were found for threat perceptions and benefit perceptions which suggests that the focus should be on barriers rather than benefit perceptions of the information search for breast cancer-related information.

Carrier characteristics/preferences

Besides type of threat experienced, type of information wanted and level of urgency experienced, the information search will also likely be impacted by the preferences for certain information carriers (see Johnson, 1991). As discussed earlier in this paper, different information carriers have differential capabilities of handling cancer-related information. In the current study, prior information seeking behavior was a strong predictor for intentions for future seeking behaviors (see Tables 16 and 17). This could indicate that satisfaction with specific information carriers influences information carrier choice for future seeking patterns. The following model is suggested.

Figure 6



This model is based on the notion of abstract versus personal threat perceptions, information need and urgency, differential importance of costs and benefits of the search and preferences for certain information carriers.

Health locus of control and prior information seeking processes are included because 1) they are generally considered important variables in the domain of health behavior and information seeking and 2) they were found (in the current study) to be significant predictor variables of other variables in the model, thereby adding to the development of the overall process.

Although the more purely theoretical relationships might be perceived as obscured by this many variables, the overall predictive power might be enhanced by taking this approach, explaining some of the unexplained variance. This

will admittedly be of greater advantage to the "pragmatics" than the "theorists" but the underlying theoretical foundation of Value-Expectancy theory as well as Uses and Gratifications theory may ameliorate some of these concerns. Since neither theory alone appears able to specifically address both the "health" part and the "communication" part of the topic under investigation simultaneously (i.e. disease-specific information seeking behavior), a combination of these two theories (as has also been suggested by Johnson, 1991) might be the most fruitful way of integrating health and communication theory in a more heuristic manner.

In general, although several of the relationships as specified in HBM were supported by the current study, the HBM might not be a superior framework for studying information seeking behaviors. The revised and simplified models based on HBM variables explained only a moderate amount of the variance. As is suggested by other scholars who have pitted the HBM against other models/theories (Hill et al., 1985; Mullen et al., 1987), the HBM can maybe serve better in a complimentary fashion than to serve as the sole theoretical explanation of the phenomenon. This suggests that certain core principles (such as the value-expectancy notion) may be very useful in predicting health-related information seeking behavior if this notion is combined with communication theories which focus on needs and gratifications of

information carrier usage.

Breast cancer versus other illness information seeking behavior.

The current study, and consequently the theoretical implications of the results, focused on one particular illness, breast cancer. However, breast cancer has certain attributes which may make it difficult to generalize the study's results to other illnesses. Threat perceptions, cost/benefit analysis of information search and consequently the scope of the information search may have been differentially affected by the specific attributes of this illness. The fact that breast cancer is a disease which by and large only affects women, and which, when detected early enough, can be "cured" to a great extent, may have influenced the way health beliefs impacted on breast cancer-related information seeking intentions. Therefore, in order to investigate the generalizability of this study's findings, other illnesses (and their attributes) need to be investigated in terms of their relationship to the information search.

Illness attributes and the information environment

There are various ways in which to classify illnesses (e.g. chronic versus acute; preventable versus non-preventable, etc.). In order to be able to classify all

illnesses in some systematic manner one could categorize them based on the emphasis in terms of prevention; primary prevention (preventing the disease from occuring), secondary prevention (early detection) and tertiary prevention (treatment/management of illness). Some diseases have prevention possibilities at all levels of prevention, others at none or only one level of prevention. For instance, as discussed earlier in this paper, it appears that primary prevention of breast cancer is not yet an option. The emphasis in terms of prevention is in the area of secondary and tertiary prevention (i.e. early detection and treatment). In contrast, for a disease such as AIDS, the emphasis of prevention is in the area of primary prevention rather than secondary and tertiary prevention (since this disease is still by and large incurable, regardless at which stage it is detected). Chronic illnesses such as certain forms of diabetes and asthma have their emphasis on tertiary prevention (disease management) rather than primary and secondary prevention. Other diseases, such as heart disease, cut across all levels of prevention. Then again, some diseases, such as ovarian cancer, have little promise for prevention at <u>any</u> level. These different illness attributes are likely to impact on the information environment in terms of the <u>type</u> of information available to the individual (primary, secondary and/or tertiary prevention information), <u>amount</u> of information (information about one, two or all levels of prevention) as

well as the array of outcomes of taking action (preventing illness from occuring, versus curing the illness with specific treatment options). This information environment is likely to interact with individuals' beliefs about the threat of an illness and motivation to seek out information about the illness. These latter factors will depend on the individuals' overall value expectancy belief structure in terms of specific illnesses.

Individual's disease-specific belief structure

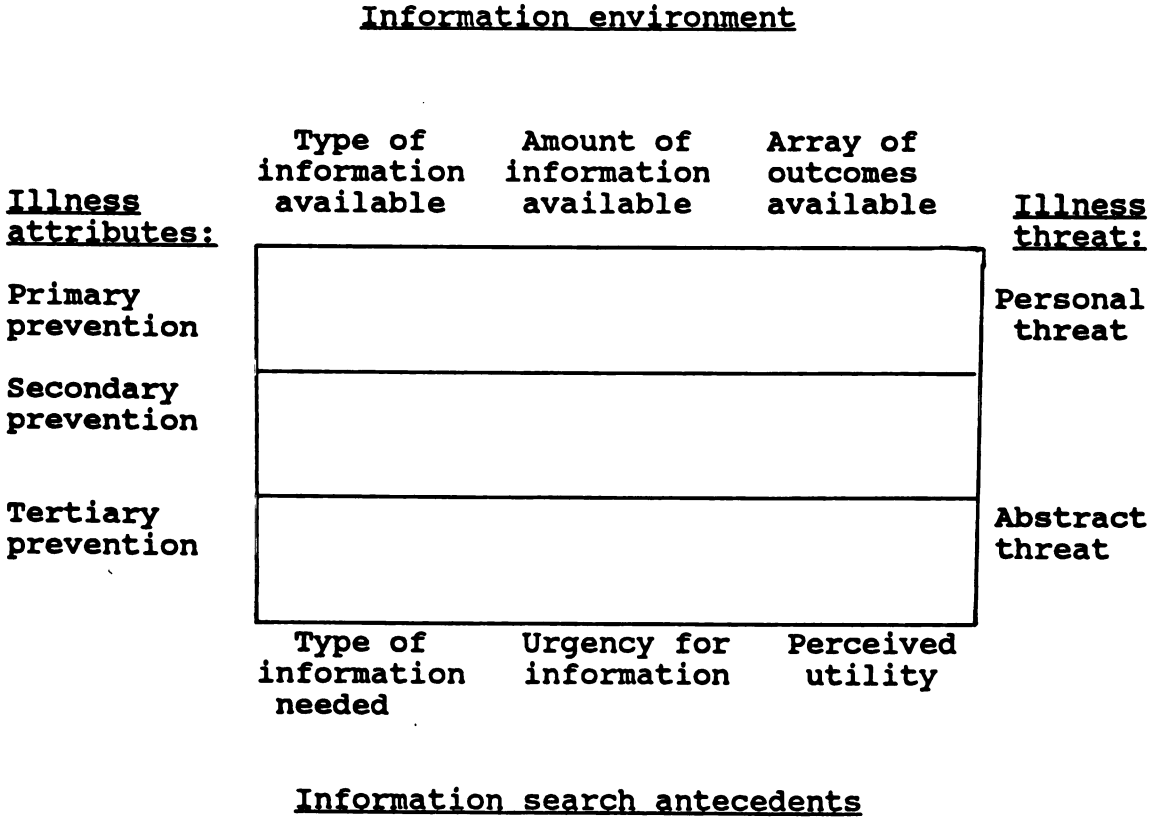
As is suggested by the Health Belief Model, the energy or force for action stems from the individual's threat perceptions (i.e. vulnerability to and seriousness of a disease). However, as discussed in the revised model (see Figure 6), it seems plausible that threat perceptions can be viewed as a dimension of personalness with a disease (i.e., perceptions on how close the illness might hit home versus a more abstract general feeling about the disease) than a mere combination of personal vulnerability and severity perceptions. Particularly in the area of information seeking, where research has shown that individuals tend to not only seek information for personal use but also for others in their environment, degree of personalness may be a more important motivating force than personal vulnerability and severity perceptions alone.

The degree of perceived personalness is likely to

directly or indirectly influence individuals' need for specific type of information, the level of urgency with which the information is needed and the perceived utility of the information. These antecedent factors are likely to influence the scope and nature of the information search.

A diagram outlining the illness attributes, information environment, threat perceptions and information search anticedents show the dynamics of the disease-specific information environment and the individual's belief structure.

Figure 7



Although the diagram does not specify the specific interactions between the dimensions, it does portray the variety of potential interactions based on the influence of illness attributes on the larger information environment and the influence of threat perceptions on information search antecedent factors.

Each dimension in this diagram puts contraints on the other dimensions in the model. For instance, degree of personalness of a health threat might provide the motivating force to seek out information about the health hazard. However, the illness attributes of the health hazard determines the type, amount and possible outcomes of the information search.

For instance, a woman might feel that (due to a family history of ovarian cancer) a personal confrontation with this illness is likely. This imminent confrontation may stimulate the need for information to reduce the threat of this disease. However, the illness attributes of this disease are such that there is very little "useful" information about any level of prevention since to date this illness can not be prevented from occuring, is very difficult to detect at an early stage and is (because of the often late detection) very fatal. The nature of the information, the absence of information and lack of positive outcomes presented in the information environment will most likely only increase threat perceptions rather than reduce them, thereby decreasing perceptions of information

utility and subsequent information seeking.

In contrast, a man's feeling that the threat of a heart attack is imminent (or a spouse's feeling that the threat of a heart attack for a significant other is imminent),is likely to increase the motivation to engage in information seeking behaviors (to reduce this threat). For this illness the illness attributes are quite different than for ovarian cancer. Heart disease can be dealt with at any level of prevention. There are ways to decrease the chance of a heart attack from occurring by adjusting one's diet, cholesterol level, exercise habits, smoking and other life-style habits. Additionally, certain medical tests can detect heart disease at an early stage, enhancing chances for survival. Lastly, heart attack victims can be treated (if they survive the actual attack) fairly successfully by a variety of treatment procedures (i.e. trombolitic therapy, pace maker, open heart surgery, etc.). Because of these illness attributes then, there will be a great deal of different information about this illness encompassing a variety of outcomes. In this case, the diversity, abundance and large array of potentially positive outcomes may decrease the threat and increase information seeking.

More research needs to be conducted to investigate these complicated interactions between illness attributes, information environment and information seeking antecedent variables.

Methodological Implications

Besides theoretical implications, the results of this study suggest several methodological implications for future research.

Scale development

Although many investigators have used the HBM as the underlying theoretical foundation for their research, relatively little attention has been given to scale development (especially in measuring perceptions toward a specific illness). Compared to the wealth of studies which have used Health Belief Model components, very few studies have actually focused on validation of measurement instruments (Maiman, Becker, Kirscht, Haefner, & Drachman, 1977; Weissfeld, Brock, Kirscht & Hawthorne, 1987; Jette, et al., 1981; Cummings, Jette, & Rosenstock, 1978; Champion, 1984; Given, Given, Galling & Condon, 1983), most of which have focused on general rather than disease specific threat and cost/benefit analysis perceptions. This is particularly important in the light of the fact that many of the HBM components appear to be classes of variables rather than uni-dimensional constructs.

In 1974 Rosenstock argued that "no two studies of the model's variables have used identical questions for determining the presence or absence of each belief", and that "raises the possibility that the concepts being

measured may also vary from study to study" (p. 372). Almost a decade later Jette et al., (1981) argued that this problem is still prevalent. Janz and Becker (1984) in their extensive review of HBM studies also acknowledged that variability of measurement makes interpretation of results and comparisons of findings across studies difficult. Studies conducted since that time, indicate that to date investigators still do not use similar questions in measuring these core beliefs, and all too often use only one-item measures, which hampers assessment of reliability of the scales.

Although in the current study an attempt was made to measure all constructs with multiple indicants, many items were lost during the confirmatory factor analysis, leaving many dimensions with merely two or three items. For some of those dimensions the reliability coefficient was fairly low (alpha =.69 for general vulnerability and alpha = .60 for personal control over one's health). However, for other two or three item scales parallelism tests and reliability coefficients (e.g. perceived severity alpha =.80, health as matter of fate, .80, benefits to information seeking, alpha =.83) showed that it's not always necessary to have many items when these items measure the same underlying construct. Much more research needs to be conducted in terms of developing the most efficient and most reliable scales for HBM constructs.

Besides reliability concerns there are issues of

dimensionality which need attention. The current study suggests that perceived threat might be a multi-dimensional rather than a unidimensional construct. This finding merits more attention for several reasons. First, it suggests that the latent construct of perceived threat, or even just perceived vulnerability to an illness might not be a single construct but a class of variables, some of which might be more important for the investigation of certain preventive health behaviors than others. The issue of what criteria need to be used in determining the presence or absence of a dimensions needs more thought, since the sheer abundance of variables in the HBM makes a pure test of this model impossible.

Secondly, these different dimensions could have a differential impact on endogenous variables or be differentially impacted upon by other endogenous or exogenous variable(s), as is suggested in this study. For instance, exposure to external message cues appeared to have a statistically significant, albeit small effect (beta weight of -.12) on perceptions of breast cancer as a "killer" disease, but no effect on perceptions of non-lethal consequences of breast cancer. This implies that one dimension of the construct "perceived severity" was impacted upon as well as impacted on differently than the other dimensions of the same construct. It seems plausible that if these dimensions are grouped together and treated as one

unidimensional construct (as has been done to date) results will be clouded.

Lastly, some people have argued that some of the HBM components (such as perceived severity) are not as strong predictors of health behaviors as others (Janz & Becker, 1984). This perceived "unimportance" could be an artifact of unreliability. Grouping items which belong to different dimensions under one unidimensional construct may attenuate the reliability coefficient.

Besides better scales for HBM components there is also a need for greater attention for conceptualization and measurement of the construct of information seeking. The fact that only four of the five information carriers for breast cancer-related information seemed to form a unidimensional scale may indicate that distinctions need to be made between authoritative/interpersonal or accessible and less accessible information carriers. Better distinctions between information seeking and information acquisition, between channels and sources, and between seeking information for one self versus seeking information for others will aid future investigations of health related information seeking.

Similarly, barriers to information seeking need more attention. Of the eleven barrier items included in the survey, only 5 were kept in the scale based on the results of the confirmatory factor analysis. Even then, the alpha

coefficient was only .66. This indicates that a great deal more work needs to be done in the area of scale development for assessing barriers to information seeking.

Advantages and disadvantages of path analysis.

Although the predictive power of some of the variables incorporated in the HBM seemed relatively low (as has been found in other studies), path analysis has the ability to further investigate these "weak" relationships. One important reason for a weak direct effect (as was found in the current study for cost/benefit analysis as well as health locus of control) could be the fact that other variables mediate the relationship. In the current study the impact of cost/benefit as well as HLOC was indirect rather than direct (or a combination of both indirect and direct influence). Without testing causal models as a whole, these variables could easily be discarded as "non-significant" and therefore not useful in predicting outcome variables, whereas in reality they may have a very important place in the overall process.

Although the use of path analysis has certain advantages, the test of the HBM as conducted in the current study also brings with it several caveats. First of all, the relationships suggested by the HBM were tested on intentions to seek information rather than actual behavior. Although several scholars, most notably Fishbein and Ajzen (1981)

have used behavioral intention as a proxy for actual behavior with some success, there have been studies which show that intentions do not always result in actual behavior. This has also been found to be true in the area of health information seeking (DeVito et al., 1982). Therefore, it is important that the models tested in this study are also replicated with actual information seeking behaviors.

Secondly, although causal analysis can provide useful insights in terms of causal relationships (especially in the area where the assumed causal relationships do not appear to hold true), these relationships do need to be validated with prospective studies. This is especially important for validation of the "revised" and "simplified" models which were generated post-hoc. Especially in regard to assessing cues to action, care needs to be taken that perceived threat to breast cancer is measured prior to the presence of a cue to action. Although the cues to action measured in this study are not easily manipulated by a researcher, more controlled settings (similar to the earlier discussed Ditto et al., 1988 study) could facilitate cause and effect relationships. Conducting studies in this fashion would simultaneously allow for better assessment of the way cues to action impact on threat perceptions (i.e., by activating already heightened threat perceptions versus increasing the perceived threat to an illness).

Pragmatic Implications

Lastly, besides theoretical and methodological implications, the results of this study suggest several pragamatic implications.

The results of the current study showed that some of the HBM model components were useful (to some extent) in predicting intentions to seek information from a variety of information carriers. However, different components appeared important for stimulating information seeking from different information carriers. This may have implications for health professionals who want to disseminate breast cancer-related information.

As Figure 5 suggests, intentions to seek breast cancer-related information from authoritative interpersonal information carriers are influenced by women's other health behaviors, exposure to health messages in one's environment, perceptions of vulnerability and (as Table 16 shows) prior search behavior. Exposure to messages in one's environment appears influenced by health behaviors which in turn is influenced by age.

This suggests several avenues for encouraging women to seek information from physicians and health professionals. First of all, the relationships in the model suggest that women who are already fairly active and/or health conscious are also the ones who are most likely to engage in future breast cancer information seeking. This implies that

stimulating external message cues (such as in mass media campaigns) can have a direct impact on intentions to seek information from physicians/health professionals. Moreover, it suggests that stimulating women to engage in other types of health behaviors may increase women's information seeking behavior (or vice versa). In the current study, health behaviors were significantly and positively related to prior information seeking for information on breast cancer prevention ($r = .15$, $p < .05$) as well as information seeking for breast cancer detection information ($r = .21$, $p < .001$).

In terms of stimulating information seeking from information carriers other than physicians and health professionals, it appears that perceptions of severity of breast cancer, combined with perceptions that the benefits of the search will outweigh the barriers are important in stimulating intentions to engage in generalized information seeking. The additional correlation analyses showed that barriers was a more important variable than benefits. This suggests that increasing the benefits (by reducing the barriers) of information seeking, might increase women's generalized information seeking behavior.

Several other pragmatic implications stem from the current study. Perceived vulnerability appeared to be a statistically significant predictor of intentions to seek information from physicians and other health professionals but not for information seeking from other channels.

Secondly, perceived severity of breast cancer was found to be an important predictor variable for information seeking intentions for channels other than physicians. This suggests that if the objective of a campaign is to get women to seek breast cancer-related information from organizations (i.e. get them to call a hotline), it might be better to emphasize the severity of breast cancer than to stress perceptions of vulnerability to breast cancer. If, on the other hand the objective is to get women to visit their doctor, the emphasis of any outreach effort would probably stand a better chance of succeeding when womens' personal vulnerability to the disease is stressed.

The findings of this study show that N=109 (35%) of the respondents said they had not <u>ever</u> sought prevention information from any of the five information carriers (i.e. doctors or health professionals, friends/family, health organizations, magazines and television), compared to N=40 (12%) for detection information. This suggests that to date there is a greater emphasis on the part of the consumer to find out about information on breast cancer detection than information on primary prevention. The results on intentions to seek information might be somewhat concerning for individuals who work in the area of dissemination of cancer-related information through other information carriers than the health professional. Although the majority of women in the sample (58%) reported to have sought information on breast

cancer detection from at least one or two sources, when asked about their intentions for future information seeking behavior, the mean for generalized information seeking was very low (mean of 2.8 on 10 point scale). The mean for intentions to seek information from physicians or other health professionals was much higher however (mean of 6.6 on 10 point scale). More research needs to be done to better understand how and why women differentiate so clearly between health professionals and " other information carriers". This might also shed light on how to make the other information carriers more useful to the consumer and more efficient to the disseminator of cancer-related information.

Conclusion

In general, the relationships between the HBM components as they are specified by its founding fathers were only partially supported. The HBM is an ecclectic model which is more an organizing than a causal model. However, as some of the "revised" models show it might be possible to specify causal relationships for some of the components under certain circumstances. Instead of using the model because of its convenience, more attention needs to be given to the specified causal relationships. In terms of predicting breast cancer-related information seeking it is suggested that the traditional HBM components may be useful when other more communication oriented variables such as "need for

information" and "preference for information carriers" are incorporated in the model.

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Table 1

Factor Loadings and Reliability Coefficients for All Scales:

Scale: Perceived susceptibility to breast cancer	Factor Loadings
General vulnerability to breast cancer (alpha = .69)	
1. It is highly unlikely that I will get breast cancer within the next five years. (*)	.59
2. It's not very likely that I will develop breast cancer during my life time. (*)	.68
3. My chances of ever getting breast cancer are slim. (*)	.67
Comparative risk assessment (alpha = .72)	
4. I am more likely to get breast cancer than most other women.	.75
5. I have many risk factors related to breast cancer.	.75
Vulnerability to late diagnosis (alpha = .70)	
6. If I got breast cancer it would most likely be discovered before it had spread. (*)	.73
7. It is very likely that if I were diagnosed with breast cancer it would be at a very early stage.(*)	.73

(*) These questions were reversed coded

Table 1 (cont'd).

Scale: Perceived severity to breast cancer	Factor Loadings
Breast cancer as a "Killer" disease. (alpha = .80)	
1. Breast cancer is always a terminal disease.	.80
2. Breast cancer is a hopeless disease.	.80
Non-lethal consequences of breast cancer. (alpha = .78)	
3. If I got breast cancer my whole life would change.	.61
4. Breast cancer is likely to result in a disfiguring physical appearance.	.63
5. Breast cancer would seriously affect my overall health.	.65
6. The thought of getting breast cancer terrifies me.	.76
7. If I got breast cancer it would devastate me.	.69

Table 1 (cont'd).

Scale: Health Locus of Control	Factor Loadings
Personal control over health status. (alpha = .61)	
1. I determine how healthy I am by the things I do.	.44
2. What happens to my health is my own doing.	.81
3. My ill health is usually the result of my own carelessness.	.52
Health determined by fate (alpha = .80)	
4. I believe that fate determines whether or not I am healthy.	.89
5. If I have continued good health it is largely a matter of good fortune.	.74
Health determined by powerful others (alpha = .66)	
6. If I become ill, the best thing I can do is to be under the care of a physician.	.64
7. I rely on medical professionals to prevent illness.	.66
8. I will not consider self-treatment methods without the approval of my doctor.	.58

Table 1 (cont'd).

Scale: Barriers to breast cancer information seeking.

(alpha = .66)	Factor Loadings
1. I am not interested in learning more about breast cancer.	.44
2. What I don't know about breast cancer, won't hurt me.	.57
3. It would cost too much money to find out whether or not I have breast cancer.	.53
4. Knowing more about breast cancer won't help me in preventing it.	.68
5. I don't think I can get information I could use on breast cancer.	.44

Scale: Benefits to breast cancer information seeking

(alpha = .83)	Factor Loadings
1. Information on how to detect breast cancer will help increase my chances of finding cancer at a very early stage.	.78
2. I have a lot to gain by finding out more about breast cancer.	.79
3. Information on how to detect breast cancer will help me in recognizing chances in my breasts.	.77

Table 1 (cont'd).

Scale: Personal Cancer Scare, (alpha = .82)	Factor Loadings
1. Have you ever experienced any unusual changes in your breasts?	.71
2. Have you every experienced unusual changes in your breasts which you thought were symptoms of breast cancer?	.82
3. Have you ever felt concerned about certain changes in your breasts?	.80

Scale: Health Concern (alpha = .73)	Factor Loadings
1. How concerned are you about your health?	.75
2. How often do you think about your health?	.75

Table 1 (cont'd).

Scale: Information seeking intentions.

How likely is it you will seek any kind of information related to breast cancer prevention and detection in the next year from:

Authoritative interpersonal information carriers	Factor Loadings
1. Doctors or other health professionals?	
Intentions to engage in generalized information seeking (alpha = .70)	
2. friends or relatives?	.42
3. health organizations?	.45
4. television?	.88
5. magazines?	.72

Table 2

Questionnaire Items - Means and Standard Deviations

I. Perceived susceptibility to breast cancer (1 "total disagreement" - 10 "total agreement")	Mean	Std
1. It is highly unlikely that I will get breast cancer within the next five years.(*)	5.7	2.6
2. I am more likely to get breast cancer than most other women.	3.4	2.7
3. I am not old enough to get breast cancer.(*)	8.8	2.4
4. If I got breast cancer it would most likely be discovered before it had spread. (*)	4.9	3.1
5. It is not very likely that I will develop breast cancer during my life time. (*)	7.1	2.5
6. My life-style puts me at risk of getting breast cancer.	3.4	2.7
7. I have many risk factors related to breast cancer.	3.7	2.8
8. It is more likely that I will get some other illness than breast cancer. (*)	5.0	2.8
9. My environment makes me more vulnerable to getting breast cancer.	3.4	2.4
10. My chances of ever getting breast cancer are slim. (*)	6.5	2.7

Table 2 (cont'd) .

	Mean	Std
11. It is very likely that if I were diagnosed with breast cancer, it would be at a very early stage. (*).	3.5	2.5

(*) These questions were reversed coded.

II. Perceived severity of breast cancer (1 "total disagreement" - 10 "total agreement")	Mean	Std
1. If I got breast cancer my whole life would change.	6.1	3.0
2. I am very afraid of getting breast cancer.	5.5	3.1
3. Breast cancer is likely to result in a disfiguring physical appearance	4.3	2.9
4. Breast cancer would seriously affect my overall health.	5.5	2.8
5. The thought of getting breast cancer terrifies me.	5.4	3.2
6. Breast cancer would be a painful experience.	7.6	2.7
7. If I got breast cancer this would have a serious impact on my finances	4.9	3.3
8. Breast cancer is always a terminal disease.	2.4	2.4
9. I worry a lot about getting breast cancer.	2.9	2.3

Table 2 (cont'd).

	Mean	Std
10. Breast cancer is a hopeless disease.	1.9	1.9
11. If I got breast cancer it would devastate me.	4.8	3.1
12. Having breast cancer would result in an early death.	2.8	2.2

III. Barriers to information seeking (1 "total disagreement" - 10 "total agreement")	Mean	Std
1. I know all I want to know about breast cancer.	4.3	3.1
2. There are other things more important than finding our more about breast cancer.	3.3	2.7
3. My doctor will tell me all I need to know about breast cancer.	5.5	3.2
4. I am not interested in learning more about breast cancer.	2.3	2.5
5. I am afraid to find out more about breast cancer.	2.1	2.2
6. What I don't know about breast cancer, won't hurt me.	1.6	1.9
7. It would cost too much money to find out whether or not I have breast cancer.	1.7	1.9

Table 2 (cont'd).

	Mean	Std
8. I am afraid someone will think I am asking dumb questions.	1.7	1.9
9. Knowing more about breast cancer won't help me in preventing it.	2.3	2.6
10. I do not have the time to get more information about breast cancer	2.1	2.1
11. I don't think I can get information I could use on breast cancer.	1.6	1.7
IV. Benefits to information seeking (1 "total disagreement" - 10 "total agreement")	Mean	Std
1. I will be better able to deal with breast cancer if I am informed about the disease.	9.2	1.9
2. Information on how to prevent breast cancer can help to decrease my chance of ever getting breast cancer.	7.9	2.9
3. Information on how to detect breast cancer will help to increase my chances of finding cancer at a very early stage.	9.3	1.9
4. I have a lot to gain by finding out more about breast cancer.	9.1	1.9

Table 2 (cont'd).

	Mean	Std
5. Information on how to detect breast cancer will help me in recognizing changes in my breasts.	9.4	1.5

V. Intentions to seek breast-cancer-related information

(1 "not likely at all" - 10 "very likely")

	Mean	Std
How likely is it you will seek information related to breast cancer prevention and detection in the next year from:		
1. doctors?	6.6	3.5
2. friends or relatives?	2.6	2.4
3. health organizations	2.8	2.8
4. television?	2.7	2.5
5. magazines?	3.3	2.7

Table 2 (cont'd).

VI. Health Locus of Control (1 "total disagreement" - 10 "total agreement")	Mean	Std
1. I determine how healthy I am by the things I do.	7.1	2.6
2. What happens to my health is my own doing.	6.9	2.7
3. My ill health is usually the result of my own carelessness.	5.6	2.9
4. If it's meant to be I will stay healthy.	4.0	3.0
5. I belief that fate determines whether or not I am healthy.	2.9	2.5
6. If I have continued good health it is largely a matter of good fortune.	3.4	2.7
7. If I become ill the best thing I can do is to be under the care of a physician.	8.7	2.2
8. I rely on medical professionals to prevent illness.	6.4	2.9
9. I will not consider self-treatment methods without the approval of a doctor.	7.2	3.1

Table 2 (cont'd).

VII. Health Concern	Mean	Std
(1 "total disagreement" - 10 "total agreement")		
1. On a scale from 1 to 10 where 1 means "not at al concerned" and 10 means "continual concern", how concerned are you with your health?	7.0	2.5
2. On a scale from 1 to 10 where 1 means "never" and 10 means "always", how often do you think about your health?	6.8	2.4

VIII. Personal scare with symptoms	Yes
(Yes/No) response codes	
1. Have you ever experienced any unusual changes in your breasts?	22%
2. Have you every experienced unusual changes in your breasts which you thought were symptoms of breast cancer?	23%
3. Have you ever felt concerned about certain changes in your breasts?	36%

Table 2 (cont'd).

IX. Cancer in one's social environment index (Yes/No) response codes	Yes
1. Have your parents ever been treated for cancer?	38%
2. Have any of your brothers or sisters ever been treated for cancer?	15%
3. Has your spouse or significant other ever been treated for cancer?	27%
4. Have any of your children ever been treated for cancer?	2%
5. Have any other relatives of yourse ever been treated for cancer?	64%
6. Has a close personal friend of yours ever been treated for cancer?	54%

X. Health Behavior index (Yes/No) response codes	Yes
1. Have you ever had a physical breast exam done by a doctor or other health professional?	96%

Table 2 (cont'd).

	Yes
2. Have you ever had a mammography?	56%
3. In the last month have you examined your breasts for signs of cancer?	64%
4. In the last year have you had a cervical smear? (pap smear)	81%
5. In the last year have you had a dental check-up?	85%

XI. External message cues (Yes/No) response codes	Yes
1. Can you recall any television program of a public service announcement dealing with breast cancer?	74%
2. Can you recall reading an article or advertisement in a magazine dealing with breast cancer?	90%
3. Can you remember any health professional talking to you about breast cancer?	84%
4. Can you recall any friend talking to you about breast cancer?	72%

Table 3

Scales: Means and Standard Deviations

Variable	Mean	Std
Perceived susceptibility		
* General vulnerability to breast cancer	6.4	2.0
* Comparative risk assessment	3.8	2.5
* Vulnerability to late diagnosis	4.3	2.4
Perceived severity		
* Severity of breast cancer (non-lethal consequences)	5.3	2.3
* Severity of breast cancer (disease as "Killer")	2.1	1.9
Cost/Benefit analysis		
* Barriers to information seeking	1.9	1.4
* Benefits to information seeking	9.2	1.5
* Cost benefit analysis (Benefits - barriers)	7.3	2.4
Health Motivation:		
* General health concern	6.9	2.1

Table 3 (cont'd).

Health Locus of Control		
* Health as a matter of fate	3.0	2.3
* Health as determined by powerful others	7.3	2.1
* Personal control over one's health	6.5	2.0
Information seeking		
* Intentions to seek breast cancer-related information from authoritative sources	6.6	3.6
* Intentions to engage in generalized information seeking	2.8	1.8

(N=264)

Note: All questions were asked on a 10-point bipolar adjective scale.

Table 3 (cont'd).

Variable	Mean	Std
Age	40.0	14.4
Education (6 pt scale)	3.3	1.1
Cancer in one's social environment (6 pt. scale)	1.8	1.1
External message cues	3.2	.9
(4 pt scale)		
Personal cancer scare	.3	.4
(3 pt scale)		
Health Behaviors (5 pt. scale)	3.8	1.0

(N=264)

Table 4

Correlation Matrices for all Scales: Uncorrected and Corrected Correlations.

Labels for correlation matrices

X1 = General vulnerability to breast cancer

X2 = Comparative risk assessment

X3 = Vulnerability to late diagnosis

X4 = Perceived severity (lethal consequences)

X5 = Perceived severity (non-lethal consequences)

X6 = Personal control over health

X7 = Health as determined by chance

X8 = Health as determined by powerful others

X9 = General health concern

X10 = Health behavior

X11 = Cost/Benefit analysis

X12 = Personal cancer scare

X13 = Cancer in one's social environment

X14 = Exposure to external message cues

X15 = Education

X16 = Age

X17 = Intentions to seek breast cancer-related information from authoritative interpersonal information carriers.

X18 = Intentions to engage in generalized breast cancer -related information seeking.

Table 4 (cont'd).

Uncorrected correlations among all the scales/variables

	X1	X2	X3	X4	X5	X6	X7	X8	X9
X1	1.00								
X2	.37*	1.00							
X3	.24*	.04	1.00						
X4	.03	.13	-.01	1.00					
X5	.00	.11	.15*	.38*	1.00				
X6	-.12	-.02	-.15*	.04	.02	1.00			
X7	-.18*	-.02	-.11	.35*	.29*	.02	1.00		
X8	-.02	.09	-.05	-.04	.11	.17*	.08	1.00	
X9	.03	.00	-.04	.11	.19*	.14	.05	.06	1.00
X10	-.09	-.06	-.28*	-.10	-.09	.06	-.05	.12	.10
X11	.07	-.06	-.03	-.21*	-.06	.13	-.31*	.21*	.17*
X12	.13	.18*	-.01	-.07	.03	.00	-.03	.12	-.00
X13	.15*	.26*	-.09	-.09	-.03	.03	-.00	.06	-.11
X14	-.04	-.07	-.02	-.16*	.00	-.00	-.08	.07	-.02
X15	-.04	.04	.02	-.09	-.05	-.06	-.13	-.19*	-.13
X16	-.12	-.13	-.21*	-.07	-.22*	.04	.02	.14	-.23*
X17	.14*	.13	-.06	-.02	.06	-.06	-.16*	.11	.15*
X18	.10	.10	.06	.25*	.28*	-.02	-.01	-.03	.23*

Table 4 (cont'd).

	X10	X11	X12	X13	X14	X15	X16	X17	X18
X10	1.00								
X11	.27*	1.00							
X12	.15*	-.00	1.00						
X13	.08	.01	.09	1.00					
X14	.26*	.27*	.07	.04	1.00				
X15	.09	.09	-.02	-.06	.08	1.00			
X16	.28*	-.10	.04	.26*	.02	-.07	1.00		
X17	.28*	.19*	.07	.10	.26*	-.05	.09	1.00	
X18	-.04	.14	.02	.02	.14*	-.13	-.19*	.35*	1.00

N=266

* p<.01

Table 4 (cont'd).

Correlations Corrected for Measurement Error

	X1	X2	X3	X4	X5	X6	X7	X8	X9
X1	1.00								
X2	.53	1.00							
X3	.34	.06	1.00						
X4	.04	.17	-.01	1.00					
X5	.00	.14	.20	.51	1.00				
X6	-.18	-.03	-.23	.06	.03	1.00			
X7	-.24	-.03	-.15	.45	.37	.03	1.00		
X8	-.03	.13	-.08	-.06	.15	.27	.11	1.00	
X9	.04	.00	-.06	.15	.25	.21	.06	.09	1.00
X10	-.11	-.07	-.32	-.11	-.11	.08	-.06	.15	.12
X11	.10	-.08	-.04	-.28	-.08	.20	-.41	.30	.24
X12	.17	.24	-.01	-.09	.03	.00	-.04	.16	-.00
X13	.18	.30	-.12	-.09	-.03	.04	-.00	.07	-.13
X14	-.05	-.08	-.02	-.18	.00	-.00	-.09	.09	-.02
X15	-.05	.05	.02	-.10	-.06	-.08	-.15	-.23	-.15
X16	-.14	-.15	-.25	-.08	-.25	.06	.02	.17	-.27
X17	.17	.14	-.08	-.03	.07	-.08	-.18	.13	.18
X18	.14	.14	.07	.33	.37	-.03	-.01	-.04	.32

Table 4 (cont'd).

	X10	X11	X12	X13	X14	X15	X16	X17	X18
X10	1.00								
X11	.32	1.00							
X12	.16	-.00	1.00						
X13	.08	.02	.10	1.00					
X14	.27	.32	.08	.04	1.00				
X15	.09	.10	-.02	-.06	.08	1.00			
X16	.28	-.12	.04	.26	.02	-.07	1.00		
X17	.28	.22	.08	.10	.26	-.05	.09	1.00	
X18	-.05	.19	.03	.02	.16	-.15	-.22	.41	1.00

N=266

Table 5

Regression Results : Impact of Threat Perceptions, Cost/benefit Analysis and Health Motivation on Intentions to Seek Information from Authoritative Information Carriers.

Overall R-squared = .121, f = 13.05 (p <.05)

(Overall *R-squared = .16)

Predictor	Beta	P	Beta*
General vulnerability to breast cancer	.17	.003	.21
Cost benefit analysis	.12	.029	.09
Health behaviors	.26	.000	.32

* (Beta-weights after correlation matrix was corrected for measurement error)

Table 5a

Regression Results : Impact of Threat Perceptions, Cost/benefit Analysis and Health Motivation on Intentions to Engage in Generalized Information Seeking.

Overall R-squared = .177 , F = 14.90 (p <.05)

(Overall *R-squared = .27)

Predictor	Beta	P	Beta*
Severity (non-lethal consequences	.20	.001	.20
Cost benefit analysis	.18	.001	.25
Health Concern	.12	.014	.15
Severity (cancer as killer disease)	.24	.000	.30

---

* (Beta-weights after correlation matrix was corrected for measurement error)

Table 6

Regression results: Impact of Cues to action and Modifying Factors on General Perceived Vulnerability to Breast Cancer.

Overall R-squared = .12 , F = 7.88 (p <.05)

(Overall *R-squared = .20)

Predictor	Beta	P	Beta*
Personal cancer scare	.13	.022	.17
Personal control over health	-.14	.015	-.21
Health as fate	-.17	.002	-.21
Age	-.17	.005	-.19
Cancer in one's social environment	.20	.001	.23

---

* (Beta-weights after correlation matrix was corrected for measurement error)

Table 7

Regression results: Impact of Cues to Action and Modifying Factors on Perceived Severity (Non-lethal consequences).

Overall R-squared = .14 , F = 15.08 (p <.05)

(Overall *R-squared = .18)

Predictor	Beta	P	Beta*
Health as fate	.29	.000	.35
Age	-.21	.000	-.19
Health determined by powerful others	.11	.050	.08

* (Beta-weights after correlation matrix was corrected for measurement error)

Table 7a

Regression results: Impact of Cues to Action and Modifying Factors on Perceived Severity (Lethal consequences).

Overall R-squared = .11 , F = 17.91 (p <.05)

(Overall *R-squared = .18)

Predictor	Beta	P	Beta*
Health as fate	.30	.000	.40
External Cues	-.12	.038	-.11

* (Beta-weights after correlation matrix was corrected for measurement error)

Table 8

Regression results: Impact of Modifying Factors on Cost/ benefit Analysis of Breast Cancer-Related Information Seeking.

Overall R-squared = .173 , F = 11.86 (p <.05)

(Overall *R-squared = .31)

Predictor	Beta	P	Beta*
Education	.10	.070	.13
Personal control over health	.10	.061	.13
Age	-.11	.041	-.14
Health as fate	-.30	.000	-.41
Health determined by powerful others	.26	.000	.38

* (Beta-weights after correlation matrix was corrected for measurement error)

Table 8 (cont'd).

Final Run

Dependent variable: Cost/benefit Analysis of Breast Cancer Information Seeking

Overall R-squared = .15 , F = 17.31 (p <.05)

(Overall *R-squared = .30)

Predictor	Beta	P	Beta*
Age	-.12	.029	-.14
Health as fate	-.31	.000	-.41
Health determined by powerful others	.26	.000	.41
(Education*)			.13

*Beta-weights after correlation matrix was corrected for measurement error)

Table 9

Regression results: Testing Direct Impact of Modifying Factors and Cues to Action on Intentions to Seek Breast Cancer-Related Information from Authoritative Interpersonal Information Carriers.

Overall R-squared = .18 , F = 11.09 (p <.05)

(Overall *R-squared = .17)

Predictor	Beta	P	Beta*
Health Concern	.15	.008	.17
External Cues	.21	.000	.20
Comparative Risk	.15	.006	
Health as fate	-.12	.026	-.16
Health Behaviors	.21	.000	.20

* (Beta-weights after correlation matrix was corrected for measurement error)

Table 9 (cont'd).

Final Run

(Overall R-squared = .13, F = 21.19 (p <.05)

(Overall *R-squared = .11)

Predictor	Beta	P	Beta*
Health Behavior	.22	.000	.23
External message cues	.22	.000	.20

* (Beta-weights after correlation matrix was corrected for measurement error)

Table 10

Regression results: Testing the Direct Impact of Modifying Factors and Cues to Action on Intentions to engage in Generalized Breast Cancer-Related Information Seeking.

(Overall R-squared = .18, F = 15.50 (p <.05)

(Overall *R-squared = .26)

Predictor	Beta	P	Beta*
Cost/Benefit analysis	.18	.002	.25
External message cues	.12	.030	.13
Perceived severity (non-lethal consequences)	.22	.000	.23
Perceived severity (lethal consequences)	.25	.000	.30

* (Beta-weights after correlation matrix was corrected for measurement error)

Table 10 (cont'd).

Final Run

(Overall R-squared = .17, F = 19.03 (p <.05)

(Overall *R-squared = .24)

Predictor	Beta	P	Beta*
Cost/Benefit analysis	.21	.000	.29
Perceived severity (non-lethal consequences)	.23	.000	.25
Perceived severity (lethal consequences)	.24	.000	.28

* (Beta-weights after correlation matrix was corrected for measurement error)

Table 11

Uncorrected and Corrected Correlations, for variables in Figure 3. (Model predicting intentions to seek information from authoritative interpersonal information carriers).

	Cancer in environment	Age	General vulnerability	Health behaviors	Information seeking intent
Cancer in environment	1.00	.28	.18	.05	.11
Age	.28	1.00	-.10	.26	.12
General Vulnerability	.22	-.12	1.00	-.11	.14
Health Behaviors	.05	.26	-.13	1.00	.27
Information seeking intent	.11	.12	.17	.27	1.00

N=287

Note: Correlations corrected for measurement error appear in lower half of triangle, uncorrected correlations in the upper half.

Table 11 (cont'd).

Uncorrected and Corrected Correlations, for variables in Figure 4. (Model predicting intentions to engage in generalized breast cancer-related information seeking).

	Health as chance	Severity (non-lethal)	Cost/Benefit analysis	Information seeking intent
Health as chance	1.00	.30	-.32	.00
Severity (non-lethal)	.38	1.00	-.05	.31
Cost/Benefit analysis	-.42	-.06	1.00	.14
Information seeking intent	.01	.41	.19	1.00

N=282

Note: Correlations corrected for measurement error appear in lower half of triangle, uncorrected correlations in the upper half.

Table 11 (cont'd).

Uncorrected and Corrected Correlations, for variables in Figure 4a. (Model predicting intentions to engage in generalized breast cancer-related information seeking).

	Health as chance	Severity (lethal)	Cost/Benefit analysis	Information seeking intent
Health as chance	1.00	.30	-.30	.06
Severity (lethal)	.38	1.00	-.21	.25
Cost/Benefit analysis	-.39	-.28	1.00	.15
Information seeking intent	.08	.33	.21	1.00

N=289

Note: Correlations corrected for measurement error appear in lower half of triangle, uncorrected correlations in the upper half.

Table 11 (cont'd).

Uncorrected and Corrected Correlations, for variables in Figure 5. (Model predicting direct effects of HBM components on intentions to seek breast cancer-related information from authoritative interpersonal information carriers).

	x1	x2	x3	x4	x5	x6
(x1) Age	1.00	.28	.26	-.10	.03	.12
(x2) Cancer in environment	.28	1.00	.05	.18	.05	.11
(x3) Health behavior	.26	.05	1.00	-.11	.25	.26
(x4) General vulnerability	-.11	.22	-.13	1.00	-.02	.15
(x5) External message cues	.03	.05	.25	-.03	1.00	.28
(x6) Information seeking intent	.12	.11	.26	.18	.28	1.00

N=286

Note: Correlations corrected for measurement error appear in lower half of triangle, uncorrected correlations in the upper half.

Table 12

Test of the Causal Relationships as specified by the Health Belief Model: Predicting intentions to seek information from authoritative interpersonal information carriers.

	Endogenous variables in the model		
Exogenous & Endogenous Variables	General vulnerability	Cost/Benefit analysis	Information seeking intentions
Modifying Factors:			
a) HLOC:			
Powerful Others	----	.27	----
Health as fate	-.17	-.32	----
Personal control	.13	----	----
b) Demographics:			
Age	-.17	-.13	----
Cues to Action:			
Cancer in environment	.20	----	----
Personal scare	.13	----	----
Health Motivation:			
Health behaviors	----	----	.26
Perceived threat:			
General vulnerability	----	----	.16
Cost/Benefit:	----	----	.11

Chi-square= 9.29 (13 df)/SSE= .1071197
N=276
Multiple R for DV=.35

Note: All the path coefficients in this model are statistically significant at $p<.05$.

--- pertains to the absence of a specified relationship. Consequently, these relationships are not tested in this model.

The Model doesn't fit!

Table 12a

Revised Health Belief Model: Predicting intentions to seek information from authoritative interpersonal information carriers.

Exogenous & Endogenous variables	General vulnerability	Cost/ Benefit analysis	Health Behaviors	Information seeking intentions
		Endogenous variables in the model		
Modifying Factors:				
a) HLOC:				
Powerful Others	----	.27	----	----
Health as fate	-.17	-.32	----	----
Personal control	----	----	----	----
b) Demographics:				
Age	-.16	-.14	.28	----
Cues to Action:				
Cancer in environment.	.23	----	----	----
Personal scare	----	----	----	----
Health Motivation:				
Health behaviors	----	----	----	.26
Perceived threat:				
General vulnerability	----	----	-.11	.17
Cost/Benefit:	----	----	.29	.11

Chi-square=2.50 (Df 10)/SSE: 2.134945-02
N=276
Multiple R for DV = .35

Note: All path coefficients are statistically significant at $p<.05$

--- pertains to the absence of a specified relationship. Consequently, these relationships are not tested in this model.

Model fits!

Table 12b

Revised and Simplified Health Belief Model: Predicting Intentions to seek information from authoritative interpersonal information carriers.

Exogenous & Endogenous variables	General vulnerability	Cost/ Benefit analysis	Health Behaviors	Information seeking intentions
		Endogenous variables in the model		
Modifying Factors:				
a) HLOC:				
Powerful Others	----	.27	----	----
Health as fate	----	-.32	----	----
Personal control	----	----	----	----
b) Demographics:				
Age	----	-.13	.28	----
Cues to Action:				
Cancer in environment	----	----	----	-----
Personal scare	----	----	----	-----
Health Motivation:				
Health behaviors	----	----	----	.23
Perceived threat:				
General vulnerability	----	----	----	----
Cost/Benefit:	----	----	.28	.14

Chi-square = 1.90 (Df)/SSE: 1.668829E-2
N=281
Multiple R for DV = .30

Note: All path coefficients are statistically significant at $p<.05$.

--- pertains to the absence of a specified relationship. Consequently, these relationships are not tested in this model.

Model fits!

Table 12c

Second Revised and Simplified Health Belief Model: Predicting intentions to seek information from authoritative interpersonal information carriers.

	Endogenous variables in the model			
Exogenous & Endogenous variables	General vulnerability	Cost/ Benefit analysis	Health Behaviors	Information seeking intentions
Modifying Factors:				
a) HLOC:				
Powerful Others	----	----	----	----
Health as fate	----	----	----	----
Personal control	----	----	----	----
b) Demographics:				
Age	-.17	----	.26	----
Cues to Action:				
Cancer in environment	.23	----	----	----
Personal scare	----	----	----	----
Health Motivation:				
Health behaviors	----	----	----	.29
Perceived threat:				
General vulnerability	----	----	----	17
Cost/Benefit:	----	----	----	----

Chi-square= 1.74 (Df 4)/SSE= 1.610078E-02
N=282
Multiple R for DV = .33

Note: All path coefficients are statistically signficant at $p<.05$

--- pertains to the absence of a specified relationship. Consequently, these relationships are not tested in this model.

This model is the "superior" model!

Table 13

Test of the Causal Relationships as specified by the Health Belief Model: Predicting intentions to engage in generalized information seeking.

	Endogenous variables in the model		
Exogenous & Endogenous variables	Severity (non-lethal)	Cost/Benefit analysis	Generalized info-seeking intentions
Modifying Factors:			
a) HLOC:			
Powerful Others	.10	.27	----
Health as fate	.28	-.35	----
b) Demographics:			
Age	-.22	-.14	----
Health Motivation:			
Health concern	----	----	.13
Perceived threat:			
Severity (non-lethal)	----	----	.29
Cost/Benefit:	----	----	.14

Chi-square= 3.36 (df 8)/SSE=4.630107E-02
N=280
Multiple R for DV=.36

Note: All the path coefficients in this model are statistically significant at $p<.05$.

--- pertains to the absence of a specified relationship. Consequently, these relationships are not tested in this model.

Model fits but several weak path coefficients

Table 13a

Revised and Simplified Health Belief Model: Predicting intentions to engage in generalized information seeking.

	Endogenous variables in the model		
Exogenous & Endogenous variables	Severity (non-lethal)	Cost/Benefit analysis	Generalized info seeking intentions
Modifying Factors:			
a) HLOC:			
Powerful Others	----	----	----
Health as fate	.30	-.32	----
b) Demographics:			
Age	----	----	----
Health Motivation:			
Health concern	----	----	----
Perceived threat:			
Severity (non-lethal)	----	----	.31
Cost/Benefit:	----	----	.16

Chi-square= .23 (df 2)/SSE=3.023019E-03
N=282
Multiple R for DV=.35

Note: All the path coefficients in this model are statistically significant at $p<.05$.

--- pertains to the absence of a specified relationship. Consequently, these relationships are not tested in this model.

This model is the "superior" model!

Table 14

Test of the Causal Relationships as specified by the Health Belief Model: Predicting intentions to engage in generalized information seeking.

Exogenous & Endogenous variables	Endogenous variables in the model: Severity ("killer")	Cost/Benefit analysis	Generalized info seeking intentions
Modifying Factors:			
a) HLOC:			
Powerful Others	----	.29	----
Health as fate	.30	-.33	----
b) Demographics:			
Age	----	-.13	----
Cues to Action:			
External message cues	-.12	----	----
Health Motivation:			
Health concern	----	----	.17
Perceived threat:			
Severity ("killer")	----	----	.29
Cost/Benefit	----	----	.18

Chi-square= 14.05 (df 12)/SSE = .1535494
N=281
Multiple R for DV=.36

Note: All the path coefficients in this model are statistically significant at $p<.05$.

--- pertains to the absence of a specified relationship. Consequently, these relationships are not tested in this model.

This model doesn't fit!

Table 14a

Second Revised and Simplified Health Belief Model: Predicting intentions to engage in generalized information seeking.

	Endogenous variables in the model		
Exogenous & Endogenous variables	Severity ("killer")	Cost/Benefit analysis	Generalized info seeking intentions
Modifying Factors:			
a) HLOC:			
Powerful Others	----	----	----
Health as fate	.34	-.32	----
b) Demographics:			
Age	----	----	----
Health Motivation:			
Health concern	----	----	----
Perceived threat:			
Severity ("killer")	----	----	.33
Cost/Benefit:	----	----	.22

Chi-square= 1.14 (df 2)/SSE = 1.45899E-02
N=282
Multiple R for DV=.37

Note: All the path coefficients in this model are statistically significant at $p<.05$.

--- pertains to the absence of a specified relationship. Consequently, these relationships are not tested in this model.

This model is the "superior" model!

Table 15

Test of the Causal Relationships as specified by the Alternative Model: Predicting intentions to seek information from authoritative interpersonal information carriers.

	Endogenous variables in the model		
Exogenous & Endogenous variables	General vulnerability	Cost/Benefit analysis	Intentions to seek information
Modifying Factors:			
a) HLOC:			
Powerful Others	----	.27	----
Health as fate	-.17	-.32	----
b) Demographics:			
Age	-.16	-.14	----
Cues to Action:			
Cancer in environment	.22	----	----
Personal scare	.12	----	----
External message cues	----	----	.20
Health Motivation:			
Health behaviors	----	----	.22
Perceived threat:			
General vulnerability	----	----	.17
Cost/Benefit:	----	----	.06

Chi-square= 14.62 (df 13)/SSE = .1567405
N=277
Multiple R for DV=.40

Note: All the path coefficients in this model are statistically significant at $p<.05$.

--- pertains to the absence of a specified relationship. Consequently, these relationships are not tested in this model.

Model doesn't fit!

Table 15a

Revised Alternative Model: Ppredicting intentions to seek information from authoritative interpersonal information carriers.

	Endogenous variables in the model				
Exogenous & Endogenous variables	General vulnera-bility	Cost/ Benefit analysis	Health Behavior	External Cues	Intent to seek information
Modifying Factors:					
a) HLOC:					
Powerful Others	----	----	----	----	----
Health as fate	----	----	----	----	----
Demographics:					
Age	----	-.16	.25	----	----
Cues to Action:					
Cancer in environment	.22	----	----	----	----
Personal scare	----	----	----	----	----
External message cues	----	----	----	----	.23
Health Motivation:					
Health behaviors	----	----	----	.25	.23
Perceived threat:					
General vulnerability	----	----	----	----	.18
Cost/Benefit:	----	----	----	----	----

Chi-square = 2.25 (df 7)/SSE = 1.88975E-02
N=286
Multiple R for DV = .39

Note: All path coefficients are statistically significant at $p<.05$.

--- pertains to the absence of a specified relationship. Consequently, these relationships are not tested in this model.

This model is "superior" model.

Table 16

Regression results: Impact of Prior Information Seeking behavior on Intentions to seek Information from Authoritative Information Carriers.

Overall R-squared = .19 , F = 13.91 (p <.05)

Predictor	Beta	P
General vulnerability to breast cancer	.14	.011
Prior information seeking (detection)	.20	.001
Health Behaviors	.21	.000
Prior information seeking (prevention)	.11	.060

Table 16 (cont'd).

Overall R-squared = .21 , F = 14.91 (p <.05)

Predictor	Beta	P
General vulnerability to breast cancer	.15	.004
Prior information seeking (detection)	.18	.003
Health Behaviors	.20	.000
External message cues	.17	.002
Prior information seeking (prevention)	.10	.090

Table 17

Regression results: Impact of Prior Information Seeking behavior on Intentions to engage in Generalized Information Seeking.

Overall R-squared = .26 , F = 19.98 (p <.05)

Predictor	Beta	P
Health motivation	.07	.160
Cost/Benefit analysis	.08	.126
Prior information seeking (detection)	.33	.000
Perceived severity (non-lethal consequences)	.28	.000
Prior information seeking (prevention)	.09	.128

Table 17 (cont'd).

Overall R-squared = .27 , F = 20.77 (p <.05)

Predictor	Beta	P
Health motivation	.12	.025
Cost/Benefit analysis	.11	.034
Prior information seeking (detection)	.31	.000
Perceived severity (lethal consequences)	.25	.000
Prior information seeking (prevention)	.11	.051

Figure 1

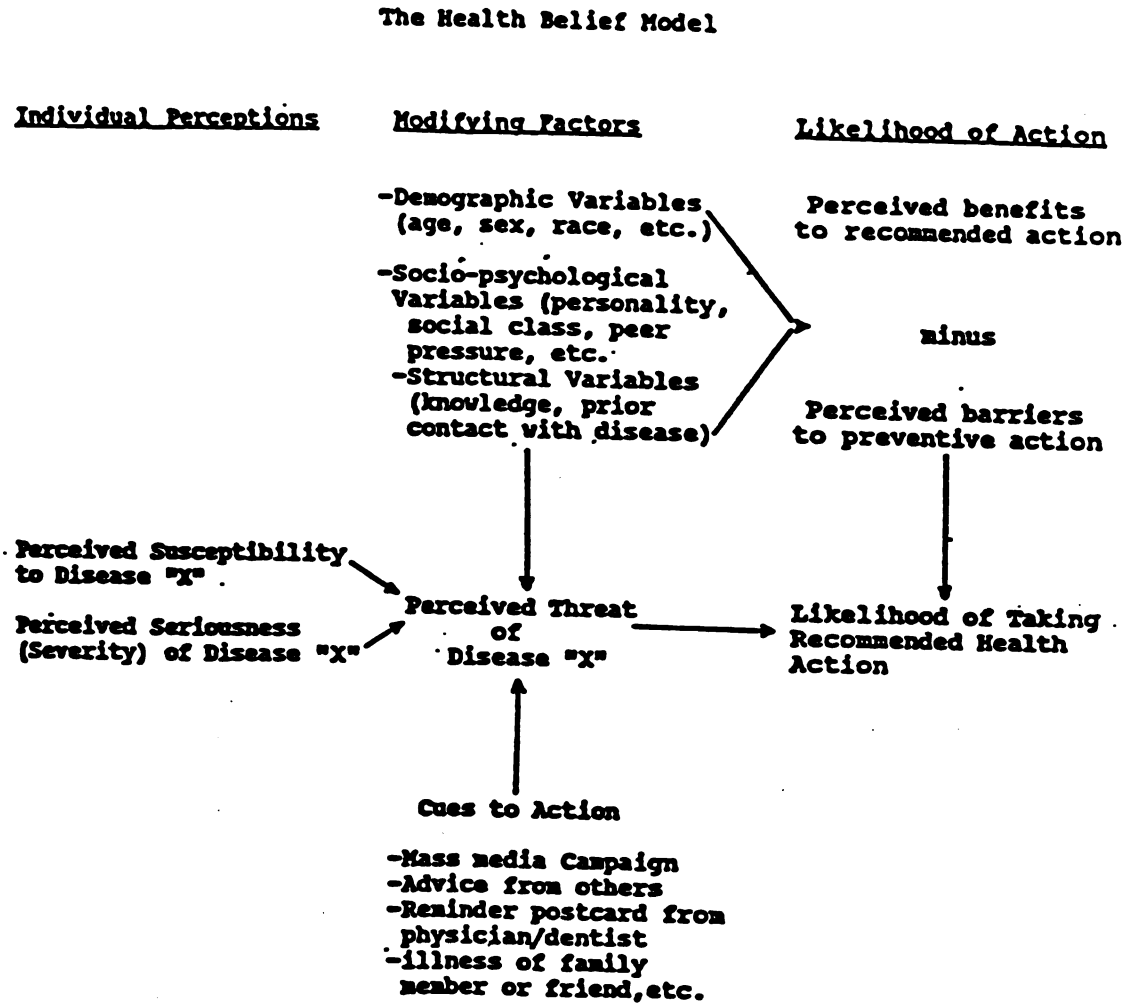

The Health Belief Model
Individual Perceptions
Modifying Factors
Likelihood of Action
-Demographic Variables (age, sex, race, etc.)
-Socio-psychological Variables (personality, social class, peer pressure, etc.
-Structural Variables (knowledge, prior contact with disease)
Perceived benefits to recommended action
minus
Perceived barriers to preventive action
Perceived Susceptibility to Disease "X"
Perceived Seriousness (Severity) of Disease "X"
Perceived Threat of Disease "X"
Likelihood of Taking Recommended Health Action
Cues to Action
-Mass media Campaign
-Advice from others
-Reminder postcard from physician/dentist
-illness of family member or friend,etc.

Figure 2

HBM Model Adapted to Breast Cancer Information Seeking

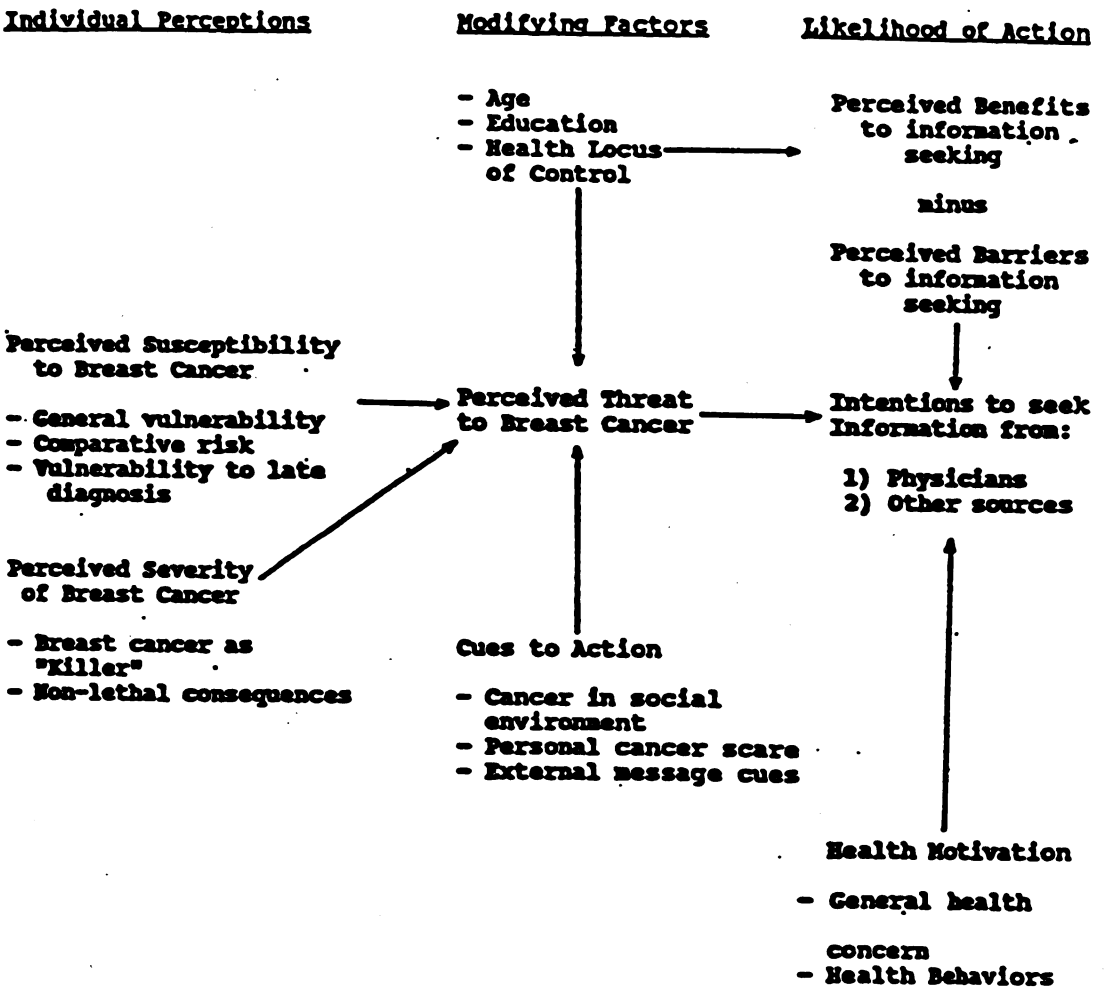


Figure 2a

Alternative Model to Breast Cancer Information Seeking

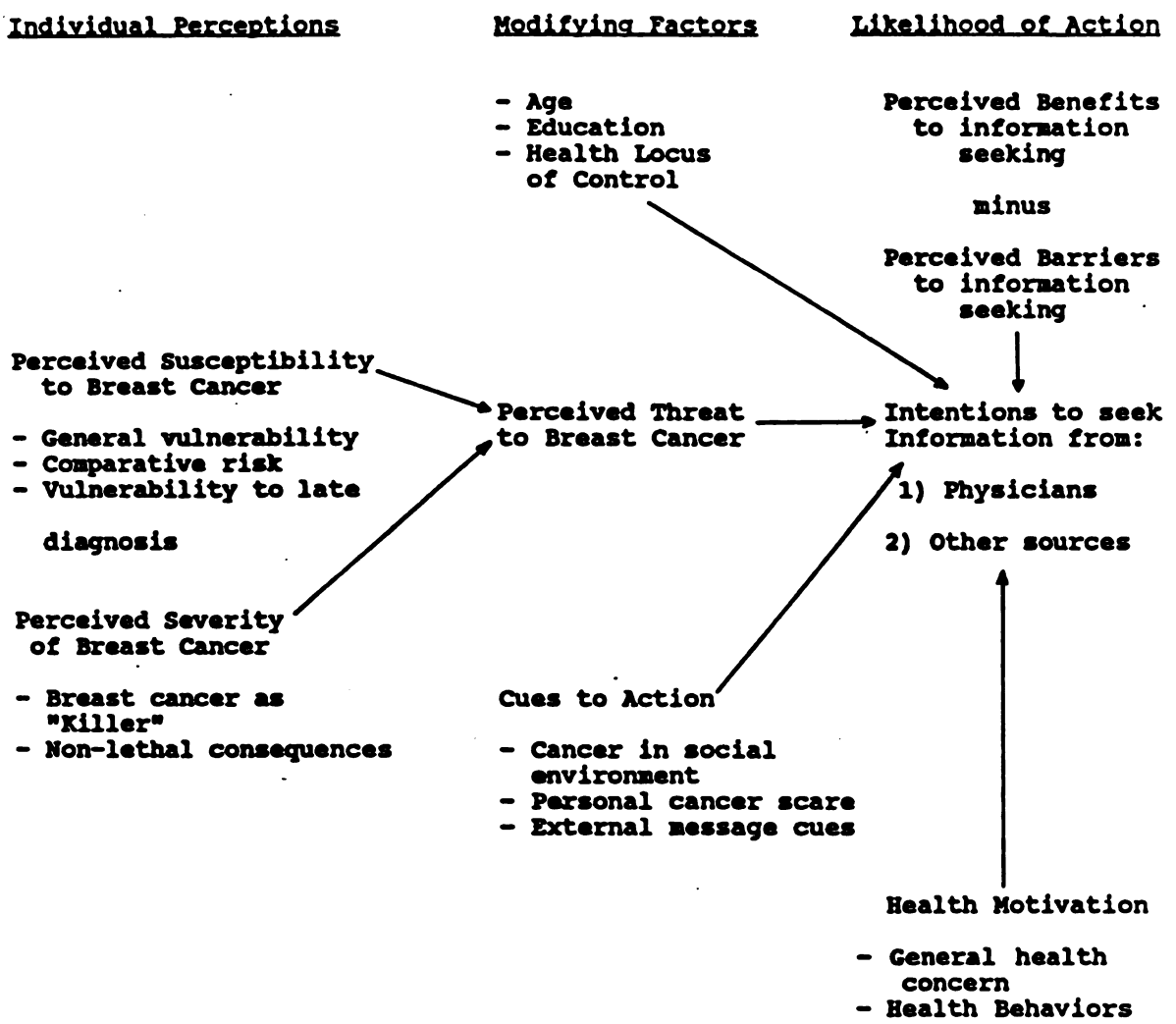


Figure 3

Revised and Simplified HBM for Predicting Intentions to Seek Information from Authoritative Interpersonal Information Carriers.

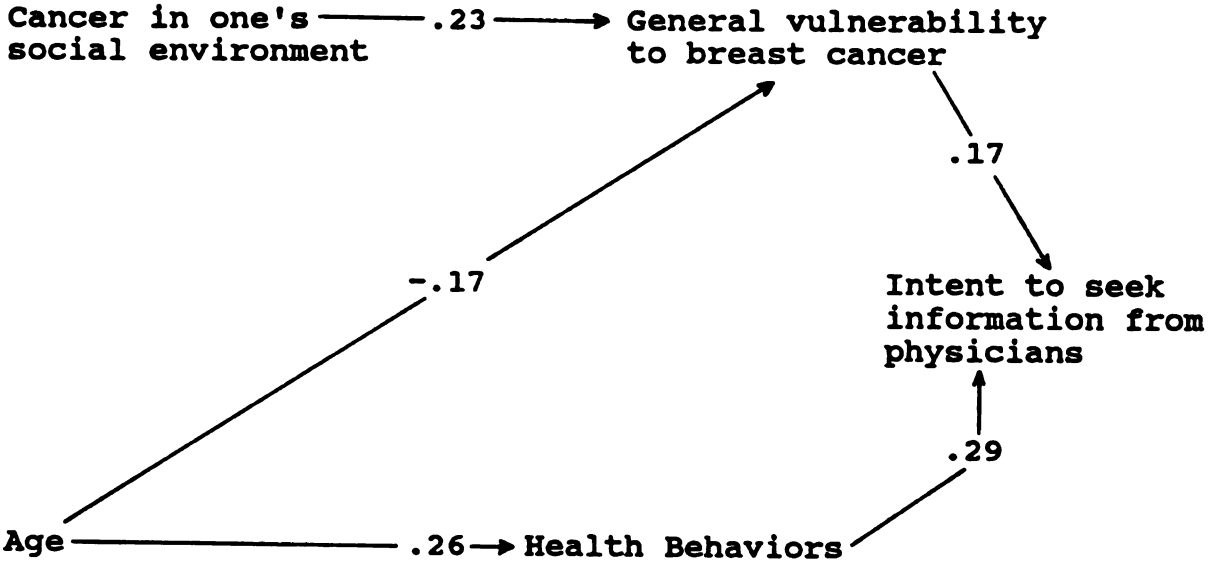


Figure 4

Revised and Simplified HBM for Predicting Intentions to Engage in Generalized Information Seeking.

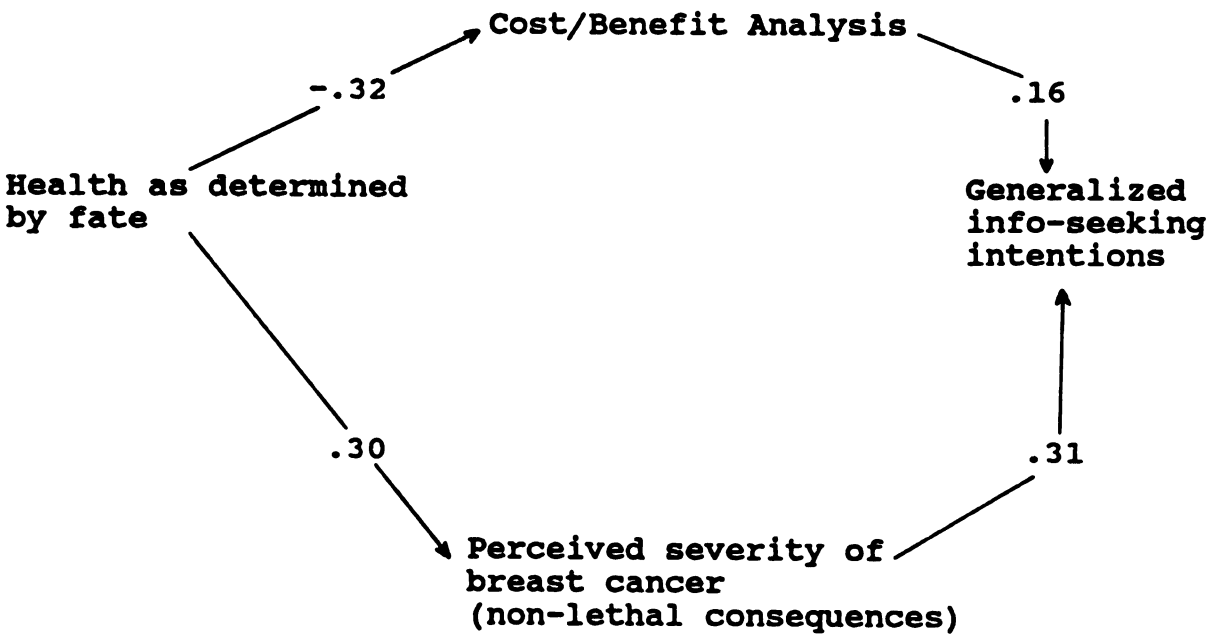


Figure 4a

Revised and Simplified HBM for Predicting Intentions to Engage in Generalized Information Seeking.

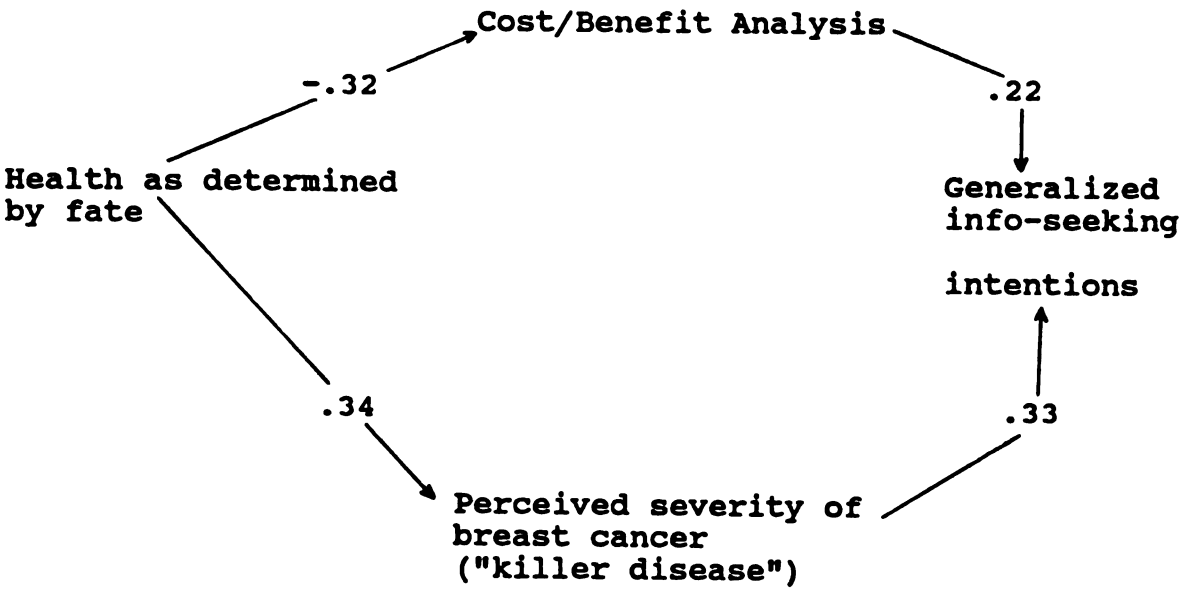
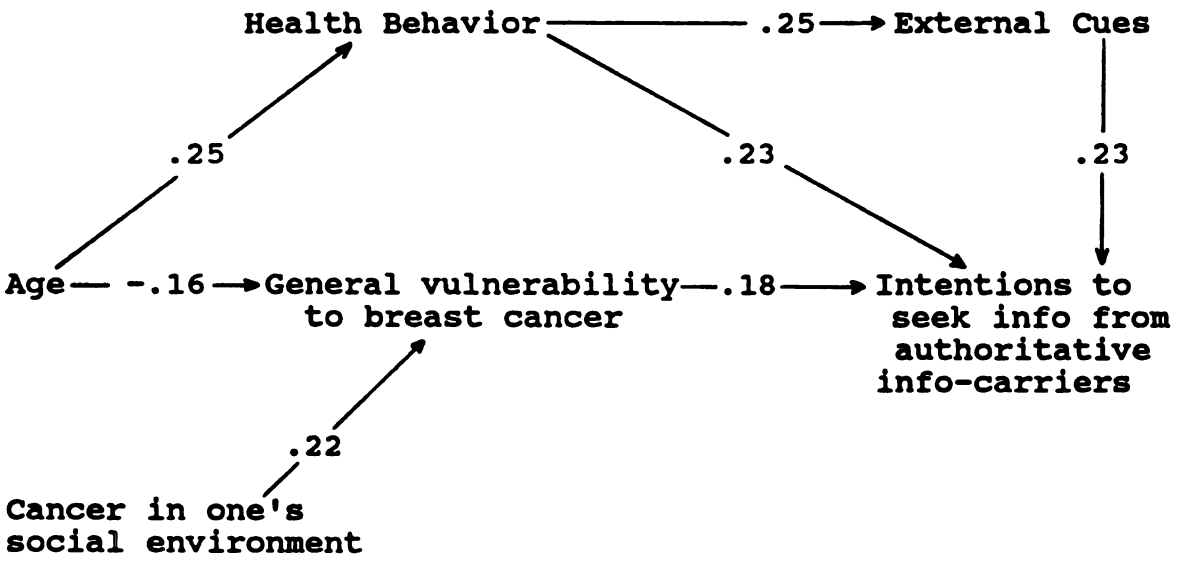


Figure 5

Revised and Simplified Alternative Model for Predicting Intentions to Seek Information from Authoritative Interpersonal Information Carriers.



APPENDICES

APPENDIX A

(Pretest exercise)

Below are the conceptual definitions of six constructs. Please read them carefully and then try to "fit" the statements under each of the categories. Category seven is an "other" category. If you can't fit an item under any one of the six categories then put it in this category.

PLEASE PUT THE NUMBER (1 through 7) OF THE CATEGORY TO WHICH YOU FEEL THE QUESTION BELONGS IN FRONT OF EACH QUESTION.

(1). Perceived susceptibility to breast cancer -refers to a woman's subjective beliefs about the likelihood of her getting breast cancer. This category also includes her perceptions about the likelihood that if she were to get breast cancer it would be detected at an early stage.

(2). Perceived severity of breast cancer - refers to a woman's subjective beliefs about the likelihood that certain negative consequences will be contingent to breast cancer.

(3). Perceived threat to breast cancer - refers to a woman's overall affective response to breast cancer.

(4). Perceived need for breast cancer information seeking - refers to a woman's perceived need for breast cancer information. This category includes perceptions about saliency of breast cancer in general as well as her perceptions on actual and current information needs.

(5). Perceived barriers to breast cancer information seeking refers to a woman's subjective beliefs about negative aspects of breast cancer information seeking. These may include perceptions that BCIS may be expensive, unpleasant, inconvenient, time consuming, and so forth).

(6). Perceived benefits of breast cancer information seeking refers to a woman's subjective beliefs about the positive aspects of breast cancer information seeking. These may include perceptions about how well BCIS will be efficacious and feasible in reducing the perceived threat to breast cancer.

(7). Other - if an item can't be fit under any of the other categories put it in this category.

Note:
For the questions dealing with barriers and benefits of cancer information seeking the statements are introduced in the following manner: "In previous research studies women have given us various reasons as to why they do or don't seek out information about breast cancer. We'd like to know if and to what extent these reasons apply to you. On a scale from 1 to 10 where 1 means "total disagreement" and 10 means "total agreement", how much do you agree with the following statements?

For the other questions women are simply asked to respond to the statements using the 10 point scale.

( ) 1. If I got breast cancer this would hurt relationships with those close to me.

( ) 2. Breast cancer is a terminal disease.

( ) 3. It's not very likely that I will develop breast cancer during my life time.

( ) 4. I worry a lot about getting breast cancer.

( ) 5. I am scared that I will find out things about breast cancer I don't want to hear.

( ) 6. There are other things more important than finding out more about breast cancer.

( ) 7. I am afraid that someone will think I am asking dumb questions about breast cancer.

( ) 8. It is more likely I will get some other illness than breast cancer.

( ) 9. Getting more information on breast cancer would only confuse me.

( ) 10. I have a lot to gain by finding out more about breast cancer.

( ) 11. I never think about breast cancer.

( ) 12. In the absense of symptoms, trying to find out whether or not one has breast cancer is asking for trouble.

( ) 13. Information on how to prevent breast cancer can help to decrease my chances of ever getting breast cancer.

( ) 14. I have many of the risk factors related to breast cancer.

( ) 15. I do not have the time to get more information about breast cancer.

( ) 16. Most women develop breast cancer during their life time.

( ) 17. What I don't know about breast cancer, won't hurt me.

( ) 18. I never think about the possibility of getting breast cancer.

( ) 19. It is highly unlikely that I would get breast cancer within the next five years.

( ) 20. It costs too much money to find out whether or not I have breast cancer.

( ) 21. I know all I want to know about breast cancer.

( ) 22. I will be able to deal better with breast cancer if I am well informed about the disease.

( ) 23. Breast cancer is a hopeless disease.

( ) 24. I am more susceptible to breast cancer than most other women.

( ) 25. I don't want other people to know how little I know about breast cancer.

( ) 26. Early detection of cancer will greatly improve my chances of survival.

( ) 27. The thought of breast cancer terrifies me.

( ) 28. I am afraid to find out out more about breast cancer.

( ) 29. I am not old enough to get breast cancer.

( ) 30. It's better not to know about all the dangers of life.

( ) 31. Information on how to detect breast cancer will help in increasing my chances of finding cancer at a very early stage.

( ) 32. I don't think I can get accurate information on breast cancer.

( ) 33. My chances of getting breast cancer are great.

( ) 34. If I got breast cancer my whole life would change.

( ) 35. I am very afraid of getting breast cancer.

( ) 36. Problems I would experience from breast cancer would last for a long time.

( ) 37. I like to keep up with the latest developments on how to prevent breast cancer.

( ) 38. Breast cancer is likely to result in a disfiguring physical appearance.

( ) 39. If I got breast cancer it would be devastating.

( ) 40. Breast cancer would be a very painful experience.

( ) 41. If I got breast cancer this would have a serious impact on my finances.

( ) 42. If I got breast cancer it would most likely be discovered before it had spread.

( ) 43. I am not interested in learning more about breast cancer.

( ) 44. I am not at all concerned about getting breast cancer.

( ) 45. If I got breast cancer, my feelings about myself would change.

( ) 46. My doctor will tell me all I need to know about breast cancer.

( ) 47. Breast cancer is a manageable disease.

( ) 48. It is very likely that if I were diagnosed with cancer it would be at a very early stage.

( ) 49. Regular breast exams help reduce my anxiety about whether or not I might have breast cancer.

( ) 50. I don't know where to turn for breast cancer information.

( ) 51. Breast cancer would seriously affect my overall health.

( ) 52. The chances that I will get breast cancer some day are good.

( ) 53. It's important to me to be as informed as I can be about breast cancer.

( ) 54. If I were diagnosed with breast cancer at a very early stage my chances of survival would be good.

I. WHICH ITEMS DO YOU FEEL SHOULD BE THROWN OUT? OR CHANGED?

II. DO YOU THINK CERTAIN ITEMS NEED TO BE ADDED?

THANKS FOR DOING THIS AWFUL TASK!!!!!!!

APPENDIX B

Health Belief Model - Breast Cancer Survey

The first set of questions ask you to think about what types of cancer information you have ever sought from a variety of sources. We ask you to separate information you have sought in terms of breast cancer prevention versus information you have sought in terms of breast cancer detection.

(INTERVIEWERS: Breast cancer prevention refers to any information on how to prevent breast cancer from occuring; Breast cancer detection refers to any information on how to detect and diagnose breast cancer; Seeking information refers to the active search of a woman for information)

Sometimes women actively seek out information on how to prevent breast cancer from occuring/developing.

1. Have you ever sought such information from a doctor or other health professional?

Yes------- No--------

IF YES,

1a. How many different doctors have you sought this information from?

Number of sources----------

2. Have you ever sought such information from a friend or relative?

Yes------- No--------

IF YES,

2a. How many different friends or relatives have you sought this information from?

Number of sources----------

3. Have you ever sought such information from a health organization such as the American Cancer Society or the National Cancer Institute's telephone hotline?

Yes------- No--------

IF YES,

3a. How many different organizations have you sought this information from?

Number of sources----------

4. Have you ever sought such information from a specific television program?

Yes------- No--------

IF YES,

4a. How many different programs have you sought this information from?

Number of programs----------

5. Have you ever sought such information from a magazine?

Yes------- No--------

IF YES,

5a. How many different magazines have you sought this information from?

Number of magazines----------

Women may also actively seek out information on how to detect breast cancer.

6. Have you ever sought such information from a doctor or other health professional?

Yes------- No--------

IF YES,

6a. How many different doctors have you sought this information from?

Number of sources----------

7. Have you ever sought such information from a friend or relative?

Yes------- No--------

IF YES,

7a. How many different friends or relatives have you sought this information from?

Number of sources----------

8. Have you ever sought such information from a health organization such as the American Cancer Society or the National Cancer Institute's telephone hotline?

Yes------- No--------

IF YES,

8a. How many different organizations have you sought this information from?

Number of sources----------

9. Have you ever sought such information from a specific television program?

Yes------- No--------

IF YES,

9a. How many different programs have you sought this information from?

Number of programs----------

10. Have you ever sought such information from a magazine?

Yes------- No--------

IF YES,

10a. How many different magazines have you sought this information from?

Number of magazines----------

11. Sometimes women seek out information on whether or not they actually HAVE breast cancer. Have you ever sought such information from a doctor or other health professional?

Yes------- No--------

IF YES,

11a. What was the result?

1. Diagnosed as having cancer (SKIP TO DEMOGRAPHIC SECTION)
2. No cancer (either not diagnosed or diagnosed as not having cancer)

The answers to the following set of questions are based on a 10 point scale. (INTERVIEWERS EXPLAIN THE SCALE LIKE YOU DID FOR OTHER SURVEY JUST USE THE EXAMPLE BELOW)

On a scale from 1 to 10 where 1 means "not likely at all" and 10 means "very likely", how likely is it you will seek any kind of information related to breast cancer prevention and detection in the next year from:

12. doctors or other health professionals? ---------

13. friends or relatives? ---------

14. health organizations? ---------

15. television? ---------

16. magazines? ---------

In previous research studies women have given us various reasons as to why they do or don't seek out information about breast cancer. We'd like to know if and to what extent these reasons apply to you. On a scale from 1 to 10 where 1 means "total disagreement" and 10 means "total agreement", how much do you agree with the following statements?

17. There are other things more important than finding out about breast cancer.

18. I know all I want to know about breast cancer.

19. My doctor will tell me all I need to know about breast cancer.

20. I am not interested in learning more about breast cancer.

21. I am afraid to find out out more about breast cancer.

22. What I don't know about breast cancer, won't hurt me.

24. It would cost too much money to find out whether or not I have breast cancer.

25. I am afraid that someone will think I am asking dumb questions about breast cancer.

26. Knowing more about breast cancer won't help me in preventing it.

27. I do not have the time to get more information about breast cancer.

28. I don't think I can get information I could use on breast cancer.

29. I will be better able to deal with breast cancer if I am well informed about the disease.

30. Information on how to prevent breast cancer can help to decrease my chances of ever getting breast cancer.

31. Information on how to detect breast cancer will help increase my chances of finding cancer at a very early stage.

32. I have a lot to gain by finding out more about breast cancer.

33. Information on how to detect breast cancer will help me in recognizing changes in my breasts.

The next set of questions deal with your beliefs about your likelihood of getting breast cancer. On a scale from 1 to 10 where 1 means "total disagreement" and 10 means "total agreement, how much do you agree with the following statements?

34. It is highly unlikely that I will get breast cancer within the next five years.

35. I am more likely to get breast cancer than most other women.

36. I am not old enough to get breast cancer.

37. If I got breast cancer it would most likely be discovered before it had spread.

38. It's not very likely that I will develop breast cancer during my life time.

39. My life-style puts me at risk of getting cancer.

40. I have many risk factors related to breast cancer.

41. It is more likely I will get some other illness than breast cancer.

42. My environment makes me more vulnerable to getting breast cancer.

44. My chances of ever getting breast cancer are slim.

45. It is very likely that if I were diagnosed with cancer it would be at a very early stage.

The following set of questions deal with your general health beliefs. On a scale from 1 to 10 where 1 means "total disagreement" and 10 means "total agreement", how much do you agree with the following statements?

46. I determine how healthy I am by the things I do.

47. What happens to my health is my own doing.

48. My ill health is usually the result of my own carelessness.

49. If it's meant to be, I will stay healthy.

50. I believe that fate determines whether or not I am healthy.

51. If I have continued good health it is largely a matter of good fortune.

52. If I become ill, the best thing I can do is to be under the care of a physician.

53. I rely on medical professionals to prevent illness.

54. I will not consider self-treatment methods without the approval of my doctor.

The following set of questions deal with some specific questions about cancer in your environment.

55. Have your parents ever been treated for cancer?

Yes------- No--------

56. Have any of your siblings ever been treated for cancer?

Yes------- No-------- Have no siblings------

57. Has your spouse or significant other ever been treated for cancer?

Yes------- No---------- Have no spouse/sig. ----------

58. Have any of your children ever been treated for cancer?

Yes------- No---------- Have no children----------

59. Has any other relatives of yours ever been treated for cancer?

Yes------- No-------- Maybe---------

60. Has a close personal friend of yours ever been treated for cancer?

Yes------- No-------- Maybe---------

61. Have you ever had a breast biopsy? (surgical procedure on your breast?)

Yes------- No-------- Maybe---------

62. Have you ever experienced any unusual changes in your breasts?

(INTERVIEWERS: unusual changes could be: pain, lump, discharge or anything else she might feel was a change)

Yes------- No-------- Maybe---------

63. Have you ever experienced unusual changes in your breast which you thought were symptoms of breast cancer?

Yes------- No-------- Maybe---------

64. Have you ever felt concerned about certain changes in your breast?

Yes------- No-------- Maybe---------

63. Have you ever had a physical breast exam done by a doctor or other health professional?

Yes------- No-------- Maybe---------

64. Can you recall any television program or PSA dealing with breast cancer?

Yes------- No-------- Maybe---------

65. Can you recall reading an article or advertisement in a magazine dealing with breast cancer?

Yes------- No-------- Maybe---------

66. Can you recall any friend talking to you about breast cancer?

Yes------- No-------- Maybe---------

67. Can you remember any health professional talking to you about breast cancer?

Yes------- No-------- Maybe---------

The next set of questions deal with specific health behaviors.

68. Have you ever had a mammography?

Yes------- No-------- Maybe---------

IF NO,

68a. Why not?

IF YES,

68b. What year did you have your last mammography?

YEAR----------

MONTH----------

68c. Why did you have your last mammography?

1. Diagnostic
   1. Doctor recommended
   2. Patient request

2. Preventive (screening)
   1. Doctor recommended
   2. Patient request

3. Other
   ----

69. Has your doctor ever recommended that you have a mammography?

Yes------- No-------- Maybe---------

70. In the last month have you examined your own breasts for signs of cancer?

Yes------- No-------- Maybe---------

71. In the last year have you had a cervical smear? (pap smear)

Yes------- No-------- Maybe---------

72. In the last year have you had a regular dental checkup.

Yes------- No-------- Maybe---------

73. Do you exercise regularly? - at least three times a week.

Yes------- No--------

74. Do you smoke?

Yes------- No--------

Now we would like to assess how likely some outcomes related to breast cancer are. On a scale from 1 to 10 where 1 means "total disagreement" and 10 means "total agreement" how much do you agree with the following statements?

79. If I got breast cancer my whole life would change.

80. I am very afraid of getting breast cancer.

81. Breast cancer is likely to result in a disfiguring physical appearance.

82. Breast cancer would seriously affect my overall health.

83. The thought of getting breast cancer terrifies me.

84. Breast cancer would be a painful experience.

85. If I got breast cancer this would have a serious impact on my finances.

86. Breast cancer is a terminal disease.

87. I worry a lot about getting breast cancer.

88. Breast cancer is a hopeless disease.

89. If I got breast cancer it would devastate me.

90. Having breast cancer would result in an early death.

---

75. On a scale from 1 to 10 where 1 means "not at all concerned" and 10 means "continual concern", how concerned are you with your health?

76. On a scale from 1 to 10 where 1 means "Never" and 10 means "Always", how frequently do you to things to improve your health?

77. On a scale from 1 to 10 where 1 means "Never" and 10 means "Always", how frequently do you search for new information related to your health?

78. On a scale from 1 to 10 where 1 means "Never" and 10 means "Always", how often do you think about your health?

Now we would like to ask you some additional questions which will only be used for statistical purposes.

91. What is the highest level of education you have received?

92. What is your race or ethnic origin?

93. What is your age?

Closing

That concludes all of my questions. Thank you for your help on this survey.

If you would like more information on cancer related topics you could call the Cancer Information Service at telephone hotline 1-800-4-CANCER.

Thank you.