

# A Comprehensive Model of Cancer-Related Information Seeking Applied to Magazines

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*This article examines a comprehensive model of information seeking (CMIS) resulting from the synthesis of three theoretical research streams: the health belief model, uses and gratifications research, and a model of media exposure and appraisal. The model postulates that four health-related factors—demographics, direct experience, salience, and beliefs—determine two information carrier factors—perceptions of information carrier characteristics and utility—which, in turn, determine information-seeking actions. A sample of 366 adult women drawn from a medium-size midwestern city was surveyed by telephone on the issue of mammography use and cancer-related information seeking. The model resulted in an excellent fit to the data received. However, the values of the paths associated with the health-related factors were extremely low, suggesting that models of information seeking from mass media, such as magazines, should focus on purely communicative factors. These results are discussed in terms of future research and the pragmatic benefits of this theoretical framework.*

Individual information seeking has become a critical element in determining health behaviors. The comfortable world where one's personal physician provided authoritative directives concerning health actions has gradually changed to one where clients make their own decisions concerning preventive behaviors and treatment options after consulting an array of information carriers (Freimuth, Stein, & Kean, 1989). In this context, individual information seeking, the purposive acquisition of information from

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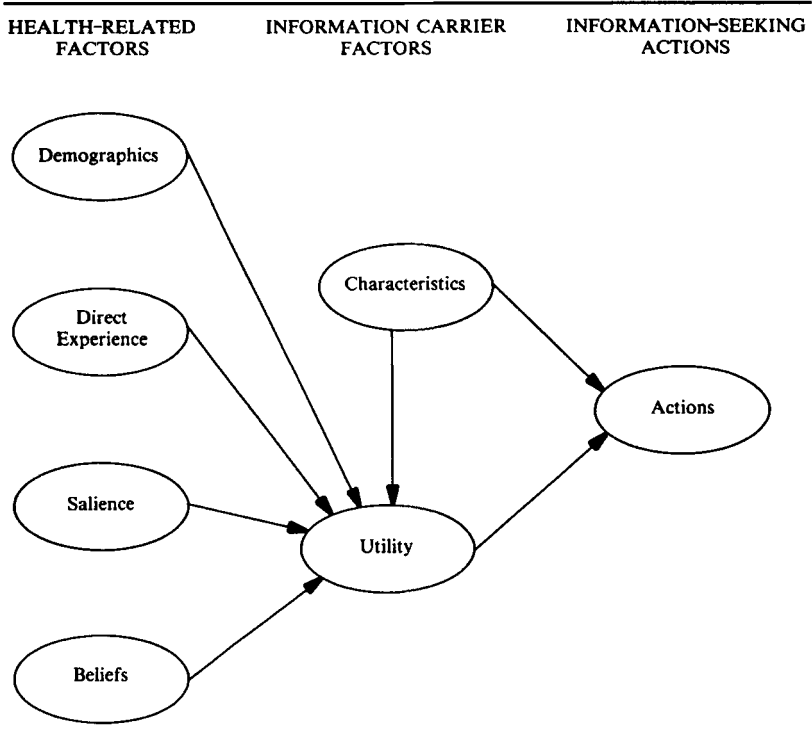
selected information carriers, becomes pivotal to the adoption of effective health practices (Lenz, 1984).

This study focuses on one particularly salient health issue, the adoption of mammography screening. Cancer of the female breast is diagnosed in about 170,000 women every year in the United States. It affects nearly one in nine American women and claims about 44,000 lives annually (American Cancer Society, 1991). Several studies have shown that the use of mammography has been effective in reducing breast cancer mortality, especially in women over 50 years of age (Miller, 1991; Shapiro, Venet, Strax, Venet, & Roeser, 1982). However, it appears that mammography generally is underused as a screening technique for the early detection of breast cancer (Fox, Baum, Klus, & Tsou, 1985; Howard, 1987). This study focuses on one major reason why mammography screening has not been optimally diffused: the information environment of women.

Regrettably, most communication research has focused on senders (e.g., professional medical sources) and how they can use persuasion and communication campaigns to influence individuals; comparatively little research has focused on the receiver as an active information seeker and processor. In addition, most models of health behaviors, such as the health belief model, have traditionally slighted or downplayed the role of communication. On the other hand, models of channel and media usage neglect the powerful health-related motivations that often impinge on individual usage of particular information carriers.

Given these critical shortcomings of different models that could be used to explain information seeking related to health, a synthesis that involves a comprehensive approach to information seeking is needed. This study tests a comprehensive model of information seeking (CMIS) (see Figure 1) resulting from the synthesis of three theoretical research streams: uses and gratifications, the health belief model, and a model of media exposure and appraisal. Most of the variables contained in the CMIS are drawn from these more narrow models, but the dynamics underlying the variables rest on many of the assumptions of uses and gratifications theory. These assumptions are particularly important for a renewed focus on receivers and information seeking.

Uses and gratifications theory assumes that individuals initiate media selection, that media use is goal directed, and that individuals select differing media and content to fulfill felt needs (Katz, Gurevitch,



**Figure 1: Comprehensive Model of Information Seeking**

& Haas, 1973; Rubin, 1986; Tan, 1985).<sup>1</sup> In the context of cancer-related information seeking, people want answers to questions that may literally mean the difference between life and death. In short, uses and gratifications theory suggests that people are active information seekers (Rubin, 1986), a view that is increasingly prevalent in cancer-related information-seeking research as well (Freimuth et al., 1989).

Naturally, there is a wide range of sources of information that women can turn to, but this research focuses on one channel, which, though widely used, is seldom studied. Especially for women, there are a number of popular magazines that contain a great deal of specific health information. Indeed, more generally, individuals are likely to read magazines for the express purpose of acquiring information, thus magazine usage is less a product of habit than are other media usage (Buss, 1967). Our prior research has also demonstrated that magazines are more highly evaluated and seen as more useful for

providing information relating to a variety of cancer contents than are more traditionally examined media, such as newspapers and television (Johnson & Meischke, 1992). Magazines, for many women, provide a critical base of information on which they may evaluate subsequently acquired information, including that from doctors, when they are confronted with a medical problem. For women with symptoms who have not yet consulted medical professionals, magazines also may provide the stimulus to do so. Finally, magazines often act as an effective agent for diffusing the most recent technical advances related to cancer.

Unfortunately, studies focusing on the uses and gratifications of magazine usage have been sparse (Payne, Severn, & Dozier, 1988), and, although uses and gratifications have been researched in a variety of areas (e.g., McLeod, Bybee, & Durall, 1982), not much is known about the theory's application to cancer-related information seeking. Perhaps the most telling theoretical weakness of a uses and gratifications approach is its failure to specify the initial motivating conditions for information seeking (Rubin, 1986; Tan, 1985). As the next section reveals, incorporating elements of the health belief model into a comprehensive model of information seeking addresses this concern.

## HEALTH-RELATED FACTORS

Our central concern with information seeking requires us to modify/elaborate on previous theoretical efforts in the health area that tend to cover communication only in passing. For example, the health belief model (Rosenstock, 1974a, 1974b) includes communication as only one of many potential cues to action. The variables contained in the health-related factors portion of the model (see Figure 1) are drawn heavily from the health belief model, which, in turn, is drawn from the work of Lewin and other social psychologists (Mikhail, 1981).<sup>2</sup>

### Demographics

Demographic factors have been included in a number of models of health behavior (Cummings, Becker, & Maile, 1980), although typically these factors account for low proportions of the variance in information seeking (Lenz, 1984). Past research has shown more

generally that people's use of the various sources of health-related information varies by age, sex, education, and race (Freimuth et al., 1989; National Institutes of Health, 1983). As a result, demographic factors are posited to relate to the perceived utility of magazines.<sup>3</sup>

### Direct Experience

Another factor that affects cancer-related information seeking is an individual's degree of direct experience with the disease, either through symptoms or in one's personal network. If anyone in a person's social network has had experience with cancer, this increases the social significance of cancer information (Atkin, 1973), and this sort of experience has predicted information seeking about cancer (Lenz, 1984).

### Salience

Evans and Clarke (1983) have stated that "information is valued to the degree it is salient. Salience to an individual means the perceived applicability of information to a problem that he or she faces" (p. 239). Thus an individual might wonder, "Is it important that I do something?" Salience refers to the personal significance of health information to an individual and is related to the degree of perceived health threat an individual feels, a factor that has been included in several models of health behavior (Cummings et al., 1980). An individual's motivation to seek information and the specific targets of this search are affected by the personal relevancy of the disease. Although the force of salience may be determined by the interaction of a number of variables, our concern is with the outcomes of these processes that can be said to drive a certain level of information seeking. Thus salience provides the underlying motive force to seek information.

### Beliefs

An individual's belief in the efficacy of various medical procedures associated with cancer can also have an influence on his or her cancer-related information seeking (Rosenstock, Strecher, & Becker, 1988). The question that individuals pose to themselves here is "Can I do something?" A corresponding belief that there is no procedure available for early detection of cancer would actually impede infor-

mation seeking. Thus information seeking is related to the extent to which individuals perceive they control the future or perceive that there are efficacious methods of prevention and control (Rosenstock, 1974b).

Although the health belief model has served as a valuable heuristic for organizing and directing research related to preventive health behaviors, it has several limitations as a model of information seeking.<sup>4</sup> Most important for this study is the fact that the health belief model has traditionally slighted cues to action and totally ignored other important communication variables.<sup>5</sup> The model does not even consider such issues as the characteristics of the source of the message and the manner in which a message is presented, although more recently it has been suggested that factors related to number and type of sources should be incorporated in the model (Rosenstock et al., 1988). This suggests that a more elaborated specification of the role that communication plays in these processes is necessary and that a more general approach to the underlying factors that lead to information seeking would be useful. In the CMIS, the four health-related factors are expected to determine perceptions of the utility of the media for providing cancer-related information. Thus, in the CMIS, information seeking is driven by factors traditionally incorporated in models of health behaviors, but its exact form is shaped by information carrier factors.

### INFORMATION CARRIER FACTORS

The information carrier factors are drawn from the model of media exposure and appraisal (MEA) that has been tested on a variety of information carriers and in a variety of cultural settings (Johnson, 1983, 1984a, 1984b, 1987; Johnson & Oliveira, 1988). These studies point to several contingent differences in the tests of the MEA model that the specification of health-related factors as the driving force in information seeking, some modifications in the nature of the variables contained in the MEA model,<sup>6</sup> and a focus on cancer-related content should correct. Following the MEA model, the CMIS posits determinative relationships between the two information carrier factors—characteristics and utility—and information seeking actions. Thus the CMIS directly links respondent evaluations of a medium with their exposure to it, a focus shared by other programmatic research in this

area (e.g., J. Burgoon & Burgoon, 1980; M. Burgoon & Burgoon, 1979; Burgoon, Burgoon, & Wilkinson, 1981).

### Information Carrier Characteristics

Information carrier characteristics, such as editorial tone and communication potential, primarily relate to message content attributes. Editorial tone reflects an audience member's perception of the credibility and intentions of a medium. If individuals perceive that a medium has motives other than the mere provision of information, then this will weigh heavily in their exposure decisions. In general, prior tests of the MEA model found a positive relationship between this indicant and utility. However, a mixed pattern of results was found for its relationship to media exposure variables. This may have been partially a result of a failure to incorporate content and related background factors, such as those specified in the health-related factors portion of the CMIS, more explicitly in the former tests of the MEA model.

Communication potential, the other dimension examined in prior research, refers to an individual's perception of the manner in which information is presented. This dimension relates to issues of style and comprehension. For example, is a magazine article visually stimulating and well-written? The CMIS predicts that the higher the evaluations of characteristics, the greater will be an individual's exposure to and perceptions of the utility of a medium. These causal linkages have been supported in prior research results for the MEA model.

### Utility

Whereas information carrier characteristics involve a direct evaluation by an individual of a particular medium, the final dimension, utility, relates the information provided by the medium directly to the needs of an individual. For example, is the information contained in the medium important for the individual's purposes, relevant, and topical? Atkin (1973) has argued that mass media exposure will result from a combination of such needs of the receiver and the attributes of a message. Generally, prior research on the MEA model has found positive relationships between utility and exposure. Because utility is related to a person's perceived readiness or intention to engage in information seeking, it is expected to relate positively with information-seeking actions.

## INFORMATION-SEEKING ACTIONS

Information seeking can be defined simply as the purposive acquisition of information from selected information carriers. Messages, sources, and channels can be classified under the more general rubric of information carriers that serve as repositories of information for potential seekers. Individuals receive cancer-related information from a variety of information carriers, such as interpersonal channels (e.g., physicians), cancer-related organizations, and media (Johnson, Meischke, Grau, & Johnson, 1992). These channels often serve different functions for the individual in the cancer control process. For example, the mass media may be an excellent source for increasing the public's awareness of behaviors that can be performed to prevent cancer, but other sources that involve interpersonal contacts may be better at persuading people to adopt these behaviors (Rogers, 1983).

In the present research, we focus on magazines, an increasingly popular channel for the delivery of health-related information, especially breast cancer information (Kessler, 1989). Indeed, information in magazines is more often actively "sought" than incidentally "received" (Singer, 1980). Magazines are more specialized information sources, which also focus on affective needs (a common theme of "women's" magazines). Singer (1980) argues that "the combination of voluntary chosen reading material, the special-interest nature of magazines and the quality of the editorial content of the magazine, all combine an atmosphere of respect in the select, 'magazine-imperative' viewer" (p. 60). Additionally, the specific targeting of most magazines makes it more feasible to write in a style that is understandable and attractive to a particular audience (Johnson & Meischke, 1992). Singer (1980) also argues that with the increased specialization of interest-oriented magazines, readers come to the material already with some ideas about what they expect to find. Therefore, readers of "health" or "women's" magazines will more likely expect to find material concerning women's health in these magazines than in newspapers. These expectations may enhance the effectiveness of magazines as cancer information disseminators.

Naturally, there are several types of information-seeking actions that can result from the impetus provided by the foregoing set of factors contained in the CMIS. For example, Lenz (1984) has identified three different dimensions of information seeking: method, scope, and depth. Method relates to the channel selected—in the current research, magazines. The two major variables relating to information-seeking actions specifically contained in the CMIS related to maga-



zines are scope, in terms of the number of different elements of a magazine that are read, and depth, in terms of the extent of readership of particular elements of a magazine.

In many ways, the CMIS represents the "bare bones" of a causal structure. Fundamentally, it suggests that health-related factors provide the motive force for information-seeking actions, which are shaped by information carrier factors. Thus this study seeks to extend and build on prior programmatic and theoretical research to synthesize and test the comprehensive model of information seeking.

## METHOD

### Sample

A sample of 366 adult women, aged 35 years or older, drawn using add-a-digit telephone sampling techniques (see Lavrakas, 1987) from a medium-size midwestern city, was used to test the model. The respondents were characterized as follows: mean age of 50 years; 92% Caucasian, 4% African-American, and 4% Hispanic, American Indian, Asian, or other; and 3% having less than a high school level education, 30% being high school graduates, 33% having at least some college, 15% having a college degree, and 15% having a postgraduate or professional degree. The respondent refusal rate for this sample was 27.9% based on formulas developed by Lavrakas (1987).

The telephone interviews used in this study were conducted with CATI (computer-assisted telephone interviewing) equipment. To insure quality, the interviewers (all female) received 6 hours of training by project staff. In addition, a supervisor was always present and periodically monitored telephone calls while the interviews were conducted.

### Indicants

The measurement model was analyzed by means of the confirmatory factor analysis subroutine of the PACKAGE computer program (Hunter & Lim, 1987). Confirmatory factor analysis is a superior technique when the *a priori* specification of items expected to cluster together is possible (Fink & Monge, 1985; Hunter & Gerbing, 1982). Three criteria proposed by Hunter (1980; Hunter & Gerbing, 1982)—homogeneity of item content, internal consistency, and parallelism—

were used to determine the quality of all psychometric scales. In addition, the scree test was used to determine the unidimensionality of factor structures (Van de Geer, 1971). Only psychometric scales, except for the direct experience and information-seeking actions items that more directly reflect behaviors, that met these criteria were included in the model.<sup>7</sup> All psychometric scales were based on 10-point semantic-differential-type scales.

For the health factors, two demographic variables—insurance (X1) and income (X2), which particularly related to access and information seeking behaviors—were incorporated in the model. Direct experience was measured by the reported extent of personal and social experience with cancer. Personal experience (X3) was assessed by whether or not an individual had ever been diagnosed with cancer, sought a doctor's opinion on whether or not she had cancer, had symptoms in the breast she thought were breast cancer, and/or had ever experienced pain, felt a lump, had unusual changes or been concerned about changes in her breast. Cancer in someone's social environment (X4) was assessed by adding up whether or not an individual reported that any of the following individuals had been treated for cancer: parent, sibling, spouse, child, relative, or close personal friend. This is an elaboration of a scale used by Johnson et al. (1992).

The results for the health-related factors psychometric scales and the actual question wordings are contained in the appendix. These scales are derived from the work of Champion (1984) and Stillman (1977) as well as newly developed items. Two scales were used as indicators of salience: Subjective Probability (X5) (2 items,  $\alpha = .86$ ) and Fear (X6) (3 items,  $\alpha = .78$ ), a scale drawn from Meischke (1991). Two scales were developed to reflect individual beliefs: Benefit (X7) (5 items,  $\alpha = .95$ ), a scale again developed by Meischke (1991), and Drawbacks of Screening (X8) (3 items,  $\alpha = .73$ ).

Information carrier factors were represented by two scales: Editorial Tone (5 items,  $\alpha = .97$ ) and Communication Potential (4 items,  $\alpha = .94$ ).<sup>8</sup> These items were drawn primarily from a research stream that has extensively examined these variables across a variety of channels and cultural settings (Johnson, 1983, 1984a, 1984b, 1987; Johnson & Oliveira, 1988). The Content Scale (3 items,  $\alpha = .94$ ), which has been used in prior research by Johnson and Meischke (1991), and the Surveillance Scale (7 items,  $\alpha = .97$ ) were used as indicators of utility. The utility items are also adapted from the work of Payne et al. (1988).

Information-seeking actions were operationalized in two ways, each of which cover differing elements of this behavior (see Johnson, 1982). Magazine exposure was calculated by summing the number of times that respondents reported the following behaviors: had read something about breast cancer in the last issue of a magazine they were exposed to, had ever read about breast cancer in magazines, had noticed advertisements related to breast cancer in magazines, had noticed letters about breast cancer, and had noticed articles about breast cancer. Extent of exposure was measured by scales that asked respondents on a 1 (*merely glanced at*) to 10 (*read all of it*) bipolar adjective scale how much they had read advertisements, letters, and articles.

The separate indicants for the latent traits for the information carrier factors and information-seeking actions measures were combined by means of second-order confirmatory factor analysis. In second-order factor analysis, the scales are treated exactly like the items examined in a first-order factor analysis. Thus second-order factor analysis allows the researcher to assess specific error: error attributable to nonrandom variation associated with processes irrelevant to the purposes of the research (Hunter & Gerbing, 1982). Second-order factor analysis in cross-sectional designs, through assessment of parallelism, constitutes a direct assessment of whether scales measure the same underlying trait. This approach also removes technical problems that result in a poor fit of a recursive model to the data. As a result, second-order factor analysis greatly simplifies testing of recursive models. The resulting scales met the same criteria specified earlier for appropriate psychometric properties.<sup>9</sup> Alpha for Characteristics (Y1) was .73, for Utility (Y2) .83, and for Information-Seeking Actions (Y3) .89.

## Analysis

LISREL, a general analytic technique for estimating a linear structural equation system (i.e., path analysis) involving multiple indicators of latent variables, was used to analyze and test the model presented here.<sup>10</sup> One of the unique advantages of LISREL is that it provides estimates of the fit of the entire model to the data.

Because of the scale development described in this section, Submodel 2 of LISREL was used for the analysis (see Jöreskog & Sörbom, 1989). This model has no latent variables, but there are two kinds of

measured variables,  $X_s$  and  $Y_s$ . This model, then, is equivalent to path analysis. The overall approach developed here represents a two-step approach: first, a development of the measurement model, and, then, an assessment of the theoretical relationships.

## RESULTS

Table 1 contains the Pearson correlations, means, and standard deviations for this test. The pattern of correlations and their strengths revealed no obvious problems with multicollinearity. The few significant correlations are primarily among information carrier indicants or indicants of the same latent traits for the health factors. The means indicated low to moderate assessment of the characteristics and utility of magazines as carriers of cancer-related information, but relatively high exposure. Respondents reported that their insurance was adequate, that their mean annual income was roughly in the \$40,000 range, and that they had a moderately low level of personal experience with cancer, a low level of experience with cancer in their social environment, a moderately low subjective probability of getting cancer and fear, a high level of belief in the benefits of screening, and a perception that the drawbacks were relatively slight. The standard deviations were relatively high for the information-seeking actions, personal, subjective probability, and fear indicants.

Figure 2 contains the LISREL operationalizations of the parameters presented here and the results. The overall goodness-of-fit of the model to the data is revealed in the following indicators: chi-square of 26.92, with 16 *df*, a probability level of .05, goodness-of-fit index of .98, adjusted goodness-of-fit index of .91, and root mean square residual of .048.<sup>11</sup> The gamma paths ( $\gamma$ ) between the health factors and utility were generally quite low, with the lowest in absolute value being insurance ( $\gamma_{22} = .02$ ) and the highest social environment ( $\gamma_{24} = -.10$ ). The relationships between the endogenous variables ( $\beta$ ) were more substantial: characteristics-utility ( $\beta_{21} = .61$ ), characteristics-information seeking ( $\beta_{31} = .14$ ), and utility-source ( $\beta_{32} = .18$ ).<sup>12</sup> The psi values for utility (.61) and for information seeking (.92) were relatively high.<sup>13</sup> An inspection of the modification indices and first-order derivatives for the relationships between the latent constructs indicated that the specification of additional paths would not add substantially to the goodness-of-fit of the model.

**TABLE 1**  
**Pearson Correlations, Means, and Standard Deviations for Indicators (n = 208)**

<i>Parameter</i>	<i>Characteristics</i> (Y1)	<i>Utility</i> (Y2)	<i>Actions</i> (Y3)	<i>Insurance</i> (X1)	<i>Income</i> (X2)	<i>Personal</i> (X3)	<i>Social</i> (X4)	<i>Subjective</i> <i>Probability</i> (X5)	<i>Fear</i> (X6)	<i>Benefits</i> (X7)	<i>Drawbacks</i> (X8)
Characteristics	1.000										
Utility	0.611**	1.000									
Actions	0.253	0.266**	1.000								
Insurance	0.112	0.057	0.112	1.000							
Income	-0.096	-0.091	-0.055	0.378**	1.000						
Personal	-0.023	0.032	0.125	-0.057	0.022	1.000					
Social	0.085	-0.026	0.055	0.134	-0.076	0.200**	1.000				
Subjective probability	-0.065	-0.007	0.086	-0.023	0.022	0.116	0.193*	1.000			
Fear	-0.037	-0.036	0.078	-0.019	-0.011	0.144	0.078	0.294**	1.000		
Benefits	0.161	0.102	0.136	0.149**	0.087	0.060	0.047	-0.015	0.103	1.000	
Drawbacks	-0.041	-0.093	-0.058	-0.067	0.031	-0.080	0.015	-0.111	-0.067	0.329**	1.000
Means	32.961	38.163	3.547	7.952	2.748	3.570	2.168	7.242	12.760	42.293	23.517
Standard deviations	6.538	13.138	1.022	2.902	1.250	1.966	.947	4.770	7.468	8.948	5.554

\* $p < .05$ ; \*\* $p < .01$ .

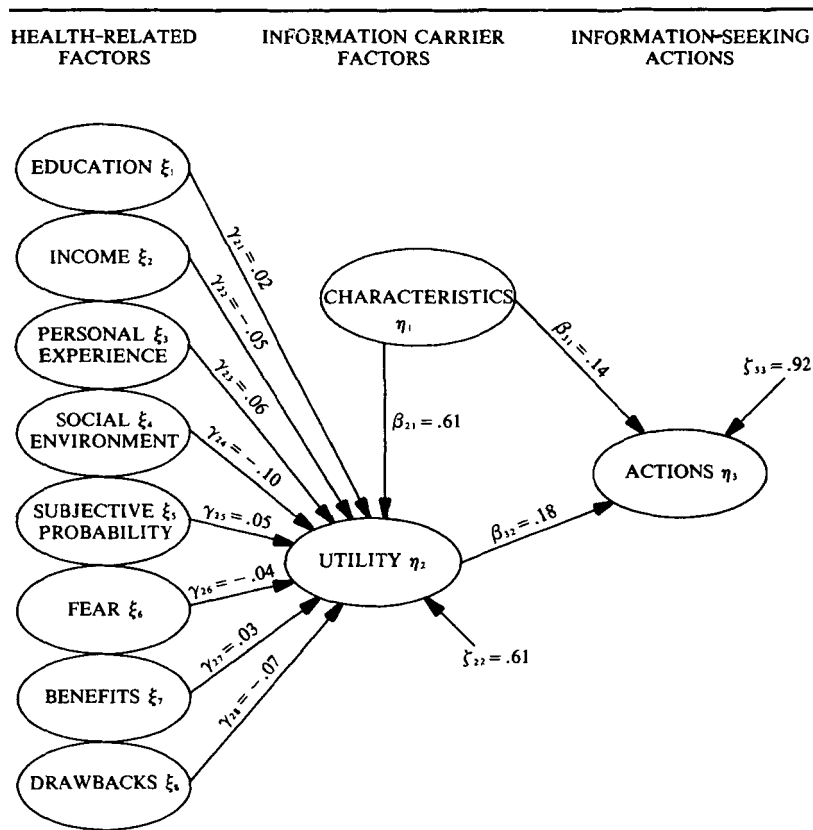


Figure 2: Maximum Likelihood Results for CMIS

## DISCUSSION

In general, the results indicated that the CMIS provided an excellent fit to the data. This approach represented a "bare bones" model, with only the most fundamental paths estimated. An examination of the modification indices supported this approach. The deletion of the path between demographics and characteristics, the only path that was not significant in any of the pilot studies (Johnson, 1991), was also supported by the modification indices found in this research. However, in this test, the values of the gamma paths suggested that *all* of them might be trimmed from the model.

Thus the weakest paths in the CMIS were those drawn from the health belief model. Traditionally, this model has accounted for only

limited proportions of the variance in health-related behaviors (Calnan, 1984; Calnan & Moss, 1984; Rosenstock et al., 1988), of which information seeking may be a special case (Meischke, 1991). Given these findings, an alternate model was tested, with all of the gamma paths fixed at zero. The fit of this model was actually superior to the CMIS, with a chi-square of 33.34 and 24 *df*, a probability level of .097, and other results equivalent or superior to the CMIS test. An examination of the modification indices for this reduced model suggested that the originally estimated gamma paths added little to the explanatory power of the model and that they had minimal indirect effects on information-seeking actions. Thus a major finding of this research is the rather disquieting one that health-related factors contribute only minimally to the CMIS. This finding could relate to two factors: the measurement model and contingent differences between channels.

### Measurement Model

The improved measurement model used in this research ameliorated a number of technical problems that clouded the results of the pilot study (Johnson, 1991). This is especially true for the results for the information carrier factors and information carrier actions, whose scales rest on well-established programs of research. For these latent variables, the individual scales could be combined because they were indicants of underlying traits, as revealed in the second-order factor analysis results. Unfortunately, this was not the case for the more psychometric variables of beliefs and of salience. For these variables, the second-order factor analyses did not result in acceptable psychometric properties, so the individual scales were evaluated separately in the model, as they have been in prior research. Thus the failure of the health belief model variables could, in part, be a result of less refined scaling. However, the overall pattern of results across both the pilot studies and this research suggest that the health variables, even if perfectly measured, would only account for minimal amounts of the variance, directly in perceptions of the relative utility of channels and indirectly in their effect on information-seeking actions.

### Channel Differences

In the pilot study, the doctor channel represented in many ways the clearest test of information seeking, with the strongest relationships between variables, especially health-related factors (Johnson, 1991).

Prior research results have also indicated that media receive relatively lower evaluations than other channels as sources of cancer-related information, even though they are the most frequently used channel (Johnson & Meischke, *in press*). The findings previously discussed and these particular findings raise doubts about whether cross-channel models of these processes can be developed. More generally, the patterns of relationships for the paths between information carrier factors and information-seeking actions suggest that there may be a qualitative difference between doctors and the other channels for these paths. Certainly, there is much less likelihood of accidental exposure to doctors than there is to the other channels. In that sense, there was less "noise" in the tests of this channel. The uses and gratifications that individuals seek from the doctor channel are also quite different from those sought from the other channels in terms of issues like typical content domains (treatment, diagnosis), compelling motivations, and the authoritativeness of answers. The findings across these studies suggest, then, that a cluster of factors need to be more closely evaluated in future tests of the model.

These factors are tied to another disappointing result of the current tests—the relatively low levels of variance explained in information-seeking actions—although the variance explained fell within the ranges classically found in studies seeking to explain media usage (Palmgreen, 1984). There are two potential explanations for these findings. One is the traditional disparity found in social science research between beliefs, intentions, and behaviors. The relationships between the information carrier factors and the information-seeking actions reflect the traditional low variance accounted for in behavior. The other is the largely accidental exposure of respondents to health information in the media—and, for that matter, other easily accessible channels, such as friends and family members—and the large number of other factors that might account for exposure, such as ritualized use of a channel and exposure driven by other concerns (e.g., entertainment) (Rubin, 1986). This might dilute the effect of the variables examined here, which were factors that were posited to activate information seeking.

In sum, seeking information from the media might be separated from health concerns, unless driven by a particular, very specific need (Reagan & Collins, 1987). Thus, at least for a general population sample not directly confronted by the disease, factors that account for media exposure generally may be much better explanatory variables



for exposure to health-related information than more purely health-oriented variables.

### Pragmatic Benefits

The primary pragmatic benefit of this research is to increase the "match" between health communication efforts and audiences. The findings of this research suggest that for acquiring information from magazines, health-related factors play much less of a role than information carrier factors. However, traditionally, communication processes related to health have generally been slighted in the social sciences, which is clearly evident in research on the health belief model. This is especially troubling given the increased burden and responsibility that individuals are expected to bear in making decisions concerning cancer treatment and prevention.

The results of this study suggest that a more modern version of the two-step flow of information might be operative (Katz & Lazarsfeld, 1955). Most individuals have easy access to the least authoritative information channels, and they value them as sources of health-related information (Johnson & Meischke, *in press*). Indeed, the public perceives the media as the source of most of its health-related information (Lieberman Research, Inc., 1978). Successful use of organizations and physicians as channels of information requires active, sophisticated, and, increasingly, privileged individuals. (For example, only 38% of individuals are aware of the CIS telephone hotline, according to the National Institutes of Health [1983].)

Individuals who act as opinion leaders (e.g., popular columnists, as well as individuals in one's social network) translate authoritative medical information for others who do not directly access such channels as doctors or organizations. However, these modern versions of opinion leaders can also educate individuals about appropriate channels to select and encourage their use. Hence magazine articles may suggest under what circumstances it is necessary to consult a physician. This is a key, and often missing, element of health education: educating the public about the characteristics and capabilities of various channels. Such campaigns are currently in vogue for a number of health-related telephone hotlines.

Thus before we can directly reach audiences we must often develop campaigns that lead to exposure to particular channels. In doing this, a twofold, and somewhat related, strategy could be employed: first,

disseminating authoritative information to those likely to directly contact target audience members and, second, encouraging these individuals to refer those whom they contact to more authoritative channels.

The new information and decision-making burdens related to health also systematically disadvantage groups in our society that already are systematically underserved by our traditional health system. Thus the concepts of an "information gap" and the "information poor" have been advanced in recent years as important policy issues related to health (Freimuth et al., 1989). One step toward reducing these gaps is greater knowledge of the factors affecting information seeking because it now appears that information-seeking variables may be much more important for such key outcomes as health than are variables more traditionally considered to be linked to these processes. In turn, this suggests that the best strategy for increasing awareness of health-related issues is the indirect one of persuading editors to place health-related content in media that individuals may turn to for more purely channel-related concerns. Thus women generally have greater exposure to health-related content partially because it appears in magazines they read for other purposes (Flay, McFall, Burton, & Warnecke, 1990).

Mass media health promotion interventions have been conducted in many areas with varied success (see Rice & Atkin, 1989). One reason why communication campaigns fail is that the channels they use can be easily avoided by large segments of the public because they are not a captive audience. Thus much more careful segmentation analysis must be performed to determine the channels and sources that women are likely to consult for particular types of information. Magazines are particularly useful for imparting to a general audience information relating to prevention and to screening guidelines. They also can provide a base of information related to treatment that would be very useful to a woman who is diagnosed as having breast cancer and who must choose, in a very short time frame, between a variety of treatment options. Because women may not be getting this information directly from doctors, given the focus on acute care in our medical system, magazines can serve a very useful health promotion function. Therefore, health professionals have an obligation to assist editors of magazines in insuring the information they do impart is authoritative and will aid in accomplishing health promotion and prevention goals. Thus magazine editors should be treated as very

powerful opinion leaders, whom medically oriented change agents should make every effort to court and educate as an indirect means of improving women's health.

### Summary

In sum, this study has developed and tested a model containing several factors—health, information carriers, and information seeking—drawn from different theoretical streams. The results suggest that the health belief model variables contributed very little to our understanding of information seeking from magazines in terms of scope and depth variables. The strongest support in the model was for the information carrier factors drawn from Johnson's model of media exposure and appraisal. Utility had moderate proportions of its variance explained by the paths-specified model, with the characteristics-utility path the strongest in the model. Future testing and refinement should focus on (a) different information carriers to examine the contingent channel differences implied by this research, (b) different demographic groups, (c) different cultural contexts, and (d) different health-related issues to determine the ultimate generalizability of this theoretical framework.

## APPENDIX

### Scale Items and Factor Loadings for Health-Related Factors

Scale Item	Factor Loading
<b>Salience</b>	
Subjective Probability	
I feel that my chances of getting breast cancer in the future are good. <sup>a</sup>	.87
There is a good possibility that I will get breast cancer.	.87
<b>Fear</b>	
I am very afraid of getting breast cancer. <sup>a</sup>	.84
I worry a lot about getting breast cancer.	.71
The thought of getting breast cancer terrifies me.	.66
<b>Beliefs</b>	
Benefits	
Breast cancer screening prevents future problems for me. <sup>b</sup>	.78
I have a lot to gain by breast cancer screenings.	.92
Breast cancer screening can help me find a lump before I would otherwise detect it.	.88
If I had regular breast cancer screenings it is likely that if I were diagnosed with breast cancer it would be at a very early stage.	.91
Breast cancer screening would reduce my fear of breast cancer.	.91
Drawbacks <sup>c</sup>	
Breast cancer screening can be dangerous to my health. <sup>b</sup>	.65
Breast cancer screening is ineffective in finding breast cancer at an early stage.	.58
Breast cancer screening is not worth the effort.	.67

a. Items measured on a scale from 1 to 10, where 1 means *total disagreement* and 10 means *total agreement*, in response to the question "How much do you agree with the following statements?"

b. Items measured on a scale from 1 to 10, where 1 means *total disagreement* and 10 means *total agreement*, in response to the question "How much do you agree with the following statements about breast cancer screening (i.e., mammography combined with physical exam done by health professional)?"

c. This scale was reverse scored for the correlations.

## NOTES

1. Uses and gratifications theory assumes that there are multiple sources of needs satisfaction, that any one communication channel must compete with other channels for satisfaction of individual needs (Tan, 1985), and that the audience is aware of and can articulate its needs (Katz, Gurevitch, & Haas, 1978; Rubin, 1986; Tan, 1985). Most criticisms of uses and gratifications research have been aimed at this methodological

point and the development of typologies of functions (Palmgreen, 1984; Rubin, 1986). This latter problem is obviated in this research by a focus on cancer-related information.

2. The health belief model shares certain similarities with uses and gratifications theory, which also specifies the social environment, demographics, group affiliations, and personality characteristics as background factors (Tan, 1985).

3. This general theoretical framework has been supported in a set of pilot studies that focused on four different communication channels—doctors, media, friends/family, and organizations—with a general population sample and a sample of women who had recently had mammography (Johnson, 1991). However, the path between demographics and information carrier characteristics was not significant in any of the tests of the model (Johnson, 1991), indicating that it should be trimmed from the model.

The current study was designed to address several shortcomings uncovered in this prior research. First, the focus is on one channel—magazines—that should have much clearer properties and more pronounced effects than some of the aggregate channels (e.g., media) examined in prior research. Second, measurement in the prior studies often relied on single-item indicators rather than scales; much more elaborate measurement of key concepts was used in this study. Third, some of the other paths, particularly between health-related factors and information carrier factors in the prior study, were weak, suggesting that they may need to be trimmed from the basic CMIS model, an issue explored more fully in this research.

4. First, the health belief model was originally intended to encompass preventive health behavior and was concerned with activation factors associated with an individual's desire to avoid diseases (Rosenstock, 1974b). Second, and somewhat relatedly, the traditional health belief model also assigns a more passive role to individuals (Leventhal, Safer, & Panagis, 1983), who are viewed as awaiting some outside cue, or stimuli, before they can act on their predispositions. Third, empirical tests of the model, while suggesting that its major variables have an impact on these processes, also suggest that there are other factors, not currently specified in the model, that might have pronounced effects (Calnan, 1984; Calnan & Moss, 1984; Rosenstock, Strecher, & Becker, 1988).

5. The health belief model historically has slighted cues to action as a component (Janz & Becker, 1984), partially because the model has only been incompletely tested in any one empirical test (Becker & Rosenstock, 1984). Rosenstock (1974b) concedes that cues to action have not been adequately examined, and a more recent review of research related to the model (see Becker & Rosenstock, 1984) suggests that this state of affairs has not changed very much and implies that cues to action (and thus communication variables) are not a major variable in the health belief model nor a major concern of its formulators. As Mikhail (1981) has stated, "Specifically what constitutes the cues to action and how they affect behavior are still in need of intensive study" (p. 71).

6. This line of research separated appraisal and utility. Both of these variables were posited to relate to exposure. However, in the three tests that specifically examined the appraisal-exposure relationships (Johnson, 1983, 1984a; Johnson & Oliveira, 1988), only minimal relationships were found. This may have been a result of the presence of the utility variable washing out the separate effects of appraisal. In the reconstituted model developed here, an overall summary appraisal of a channel is considered perhaps the ultimate expression of its utility and, therefore, these heretofore separate variables are considered part of the same latent construct.

Somewhat similarly, the information carrier characteristics of editorial tone and communication potential were separated in prior tests. However, these variables acted with the other variables in a very similar fashion suggesting that they might really be related to a more encompassing latent construct. Thus, in the current, more comprehensive model, they are treated as indicants of the more encompassing construct of information carrier characteristics. In prior tests, these indicants related strongly to appraisal and exposure, thus supporting in part the paths specified in the current comprehensive model. The combining of these indicants has also been supported in early tests of the CMIS (Johnson, 1991).

7. Naturally, during the process of scale development, items that did not meet the psychometric criteria were dropped from their scales. In addition, an entire scale focusing on the accessibility of information carriers, which was included in prior tests, was dropped because it failed to meet acceptable measurement criteria. Similarly, a scale focusing on the general utility of magazines was also dropped from the analysis.

8. A table containing the results for the separate information characteristic scales is available from the senior author.

9. The mathematics of a second-order factor analysis are equivalent to those for the first order, with the individual scales constituting items (Hunter & Gerbing, 1982). Unfortunately, none of the health-related factors could be formed into second-order scales because of failure to meet psychometric criteria. As a result, in the tests of the model, they were considered as separate indicants.

10. The interested reader can consult Jöreskog and Sörbom (1989) and Hayduk (1987) for exhaustive descriptions of LISREL. Research on the health belief model has been criticized for not employing appropriate multivariate statistics (Champion, 1985). LISREL has several advantages over traditional multiple regression when used to test models of the type examined here, which has led Palmgreen (1984) to suggest it would be the most appropriate analytic technique for testing models of this sort.

11. The standard errors for the parameters were generally low. The normalized residual fell within acceptable ranges and their associated Q-plots were also acceptable. No obvious problems with identification and/or estimation were present in the results (see Jöreskog & Sörbom, 1989, for a full discussion). Because the highest correlations of estimates was  $-.61$ , there was no indication of collinearity estimates (Hayduk, 1987).

12. The covariance matrix of Y and X indicated moderate to high covariances between the information carrier factors and information-seeking factors. For the health factors, indicants of the same latent construct had low covariances.

13.  $R^2$  is normally considered to be equivalent to  $(1 - \zeta)$ .

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