# Antecedent Characteristics of Online Cancer Information Seeking Among Rural Breast Cancer Patients: An Application of the Cognitive-Social Health Information Processing (C-SHIP) Model

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## Abstract

Little research has examined the antecedent characteristics of patients most likely to seek online cancer information. This study employs the Cognitive-Social Health Information Processing (C-SHIP) model as a framework to understand what psychosocial characteristics precede online cancer-related information seeking among rural breast cancer patients who often have fewer healthcare providers and limited local support services. Examining 144 patients who were provided free computer hardware, Internet access and training for how to use an Interactive Cancer Communication System, pre-test survey scores indicating patients' psychosocial status were correlated with specific online cancer information seeking behaviors. Each of the factors specified by the C-SHIP model had significant relationships with online cancer information seeking behaviors with the strongest findings emerging for cancer-relevant encodings and self-construals, cancer-relevant beliefs and expectancies and cancer-relevant self-regulatory competencies and skills. Specifically, patients with more negative appraisals in these domains were more likely to seek out online cancer information. Additionally, antecedent variables associated with the C-SHIP model had more frequent relationships with experiential information as compared to didactic information. This study supports the applicability of the model to discern why people afflicted with cancer may seek online information to cope with their disease.

## Introduction

Breast cancer is the most commonly diagnosed cancer in the United States, and the second leading cause of cancer death in women according to 2007 estimates by the American Cancer Society. Researchers have emphasized the importance of exploring the different contexts in which people use health information (Ziebland, 2004). Currently, many breast cancer patients are turning to the Internet for health education and support. In a national study, the National Cancer Institute found that 56.5% of breast cancer patients who have been online have visited an Internet site specifically to learn about cancer (Nelson et al., 2004). Additional analysis of this same dataset found that among women who have had breast cancer, the Internet is second only to their healthcare providers in terms of where they would go first if they had a strong need to get information about cancer (Shaw, Han, & Hawkins et al., 2006).

Not only are patients seeking information on the Internet, but research also shows that such behavior can contribute to improved learning outcomes (Gustafson et al., 2001, 2005; Shaw, Han, & Baker et al., 2006). However, little research has examined the antecedent characteristics of people who are most likely to seek online cancer information. Additionally, we are not aware any extant research exploring the characteristics that precede who searches for what topics of online cancer information. While numerous cancer-related topics are available online including medical, psychosocial and practical concerns, not all of these topics are relevant to all information seekers. Finally, cancer patients can seek out information in different forms including either didactic, fact-based forms or experiential, narrative forms (i.e., learning how other patients have coped with their treatments and their side effects). Again, no published research thus far has examined the characteristics of who seeks out didactic versus experiential online cancer information.

Importantly, though cancer is difficult for anyone experiencing it, rural residents face additional challenges endemic to rural life including fewer healthcare providers and limited local information resources and community support services (Engleman et al., 2005). More granular research in examining antecedent characteristics of cancer information seeking among rural cancer patients could provide useful insights to improve outcomes for this vulnerable population.

### Theoretical Framework: The C-SHIP Model

To examine what psychosocial characteristics are important for understanding online cancer-related information seeking, we employ the Cognitive-Social Health Information Processing (C-SHIP) model as our conceptual framework. The C-SHIP model integrates constructs relevant to health-information seeking used in the many theoretical models within the fields of health, social, personality, cognitive, clinical, and developmental psychology (Miller, Shoda, & Hurley, 1996). Using the overarching social-cognitive perspective (Cantor & Kihlstrom, 1987; Bandura, 1986; Mischel, 1973; 1990; Mischel & Shoda, 1995), the C-SHIP model draws from established concepts and findings from the broader field of psychology to identify cognitive-affective units in health information processing. Contributing concepts include strategies for encoding health information (Gritz & Bastani, 1993; Leventhal, Suls, & Leventhal, 1993; Leventhal, 1970); self-efficacy (Bandura, 1986); expectancy and value constructs in the health belief model (Becker, 1974), protection motivation theory (Maddux & Rogers, 1983), the theory of reasoned action (Ajzen & Fishbein, 1980), and the theory of planned behavior (Ajzen, 1985); and affects and emotions (Smith & Lazarus, 1990; Salovey & Birnbaum, 1989).

The C-SHIP model identifies the following cognitive-affective units in health information processing: 1) health relevant encodings; 2) health beliefs and expectancies; 3) affects; 4)

health goals and values; and 5) self-regulatory competencies and skills (Miller et al., 1996; Miller, Fang, Diefenbach, & Bales, 2001). This model posits that individuals differ with regards to both the particular cognitive-affective units (i.e., their beliefs, values, emotions, goals, competencies) and the dynamic processes through which these units interact with each other to generate health-related behavior, in this case online cancer information seeking. The C-SHIP model emphasizes the important psychosocial features of the particular situation as perceived and interpreted by the individual. This model has been used to explain how these constructs interact to bring about health protective behaviors (i.e., breast self-exam). The current study extends the C-SHIP model beyond health-protective behavior. For this study, we apply the C-SHIP model to examine how these constructs may be activated during a health crisis. We use this framework to investigate the relevance of these constructs in influencing cancer-related information seeking of rural women in the aftermath of their breast cancer diagnosis.

By emphasizing the unique individual and situational contexts relevant to information processing, the C-SHIP model calls for assessments of expectations, beliefs, and affects that are situation and behavior specific, rather than global characteristics. For our analysis, we chose the following constructs based on their representation of one of the five C-SHIP cognitive-affective units as well as for their ability to address individual or behavioral-specific contexts.

**Cancer-relevant encodings and self-construals—**This group of factors includes strategies and constructs involved in the appraisal of one's own health and illness (Miller et al., 2001). In our study, one's level of life functioning represents this category. Life functioning is a general marker of how an illness impacts one's daily experience. Level of functioning may influence one's sense of activation for pro-health behaviors in one of two possible directions. Information may be a vital resource for making changes to improve treatment side effects, or making lifestyle changes to cope with disability brought on by illness. Alternatively, reduced functioning may impair the patient's ability to utilize available online health information.

**Cancer-relevant beliefs and expectancies—**This category includes expectations activated while processing health-related information (Miller et al., 2001). Perceptions of self-efficacy in dealing with one's cancer situation are a key cognitive mechanism influencing illness adjustment (for a review see Case et al., 2005). Accordingly, those with higher self-efficacy may have a greater sense of competence to use cancer-related information, and would be more likely to utilize information in adapting to cancer. Low self-efficacy, in this case belief in the futility of treatment, feeling powerless, or feeling unable to have an influence in one's health or care outcomes, can lead to less information seeking and higher anxiety (Becker & Rosenstock, 1989; Lichter, 1987; Katz, 1968). However, an alternative perspective would suggest that patients could seek out cancer information as a coping mechanism to build up their sense of efficacy to help them in their struggle with breast cancer (Ziebland, et al., 2004).

**Cancer-relevant affects—**Factors in this group include affective states which are activated when processing cancer-related information (Miller et al., 2001), and influence subsequent information processing related to the cancer experience. Psychological adjustment affects the degree to which a cancer patient seeks information about her illness (Harris, 1998). Greater emotional difficulty, assessed here as lower levels of emotional well-being and higher levels of negative emotions, may cue the need for information to make personal changes or receive validation for one's experience, therefore motivating cancer information seeking. However, clinical levels of negative affect, characterized by despair, low motivation and low initiation of activity, and fatigue, may impair one's capacity to seek

helpful resources. The literature depicts mixed findings for the effect of mood on information seeking. In a general sample, Cotton and Gupta (2004) found that happier people were more likely to look online for health information. For breast cancer patients, low levels of mental health predicted greater use of the Internet for health-related reasons (Bowen et. al, 2003). Cancer-related anxiety has been found both to be associated with less information seeking (Wilkinson & Wilson, 1983; Pifalo, Hollander, Henderson, DeSalvo, & Gill, 1997) and with greater information seeking (Manfredi, Czaja, Buis, & Derk, 1993). Such mixed findings illustrate the importance of context-relevant assessment emphasized in the C-SHIP model.

**Cancer-relevant goals and values—**This category includes desired and valued health outcomes along with their relative subjective importance (Miller et al., 2001). Once diagnosed with cancer, specific health and treatment related goals likely emerge. For some, their goal may be to fight the cancer to the very end, "leaving no stone unturned" as they try a variety of clinical trials in the face of standard treatment failure. Others may find at some point they prioritize quality over quantity of life, and seek palliative treatment. Some patients may strive to remain active in treatment decisions, whereas others prefer to defer decision-making to their clinicians. Medical information seeking has been found to be motivated by a desire to be involved with treatment decision making (Degner et al., 1997).

**Cancer-relevant self-regulatory competencies and skills—**This group of factors includes knowledge and strategies used for dealing with barriers to disease-managing behaviors (Miller et al., 2001). A patient's competency in seeking cancer-related information can be largely determined by her competence in participating in her health care and utilizing information, as well as by actual and perceived barriers to information. Previous research demonstrated that both perceived health competence and participation in healthcare are associated with greater desire for and use of health information (Ziebland, 2004). However, studies have primarily been cross-sectional and correlational in nature; therefore the direction of this relationship remains unclear. A sense of competence in participating in health care may serve as the foundation for information-seeking behavior that compliments existing health care participation (Kivits, 2006). Alternatively, it has been postulated that patients' optimal participation in their health care necessitates having appropriate information (Fallowfield, 2001; Wallberg, 2000). Accordingly, patients may actively seek out cancer information to increase their sense of competence in participating in their health care (Ziebland, et al., 2004). Furthermore, those who have experienced barriers to receiving information within the health care system, due to cost or a lack of knowledge or time, may welcome a cancer information resource that is easy to use, convenient, and available for free (Pandey, Hart, & Tiwary, 2003).

The literature has shown that social support has a strong impact on how people cope with cancer, as it can serve as both a source of information and validation. Provision of information is one of the defining attributes of social support (Langford, Hinson, Bowsher, Maloney & Lillis, 1997). Social support networks of friends and family serve as resources for providing information and directing information seeking (Basch, Thaler, Shi, Yakren & Schrag, 2004; Coulton, 1990; Johnson & Meischke, 1993; Echlin & Rees, 2002; Elf & Wikblad, 2001). Accordingly, individuals who lack such social support may need to seek information in other venues such as the Internet.

As the C-SHIP model emphasizes individual situations and context, it is important that assessments be population specific. Findings of psychosocial factors' role in determining behaviors cannot be generalized to different types of individuals and cultures with unique experiences, barriers and social norms (Miller et al., 1996). Accordingly, this study specifically examines one population of breast cancer patients – rural Caucasians.

### Cancer Information: Source and Content Structure

Previous studies using cross-sectional self-report methodologies have played an important role in helping to understand cancer patients' information seeking preferences and intended behaviors. However, the most valid indicator of cancer information seeking behavior is to measure what people actually do as compared to what they say they did or will do. Our study was intended to contribute to the field by examining outcomes that represent actual online cancer information seeking behaviors of women using the Comprehensive Health Enhancement Support System (CHESS) "Living with Breast Cancer" program, which is a comprehensive Interactive Cancer Communication System (ICCS) that has been found to be efficacious in numerous previous studies (Gustafson et al., 1993; Gustafson et al., 1998; Gustafson et al., 2002; Gustafson et al., 2005; Gustafson et al., 1999; Gustafson et al., 2001; Hawkins et al., 1997; McTavish et al., 1995; McTavish, Pingree, Hawkins, & Gustafson, 2003; Shaw & Gustafson et al., 2006; Shaw, Hawkins, McTavish, Pingree, & Gustafson, 2006; Shaw, Han, & Baker et al., 2006; Shaw, Han, & Hawkins et al., 2006; Shaw, McTavish, Hawkins, Gustafson, & Pingree, 2000; Taylor et al., 1994).

**CHESS Content**—CHESS is a web-based system that provides a range of conceptually distinct services to patients and their families. Among other services, CHESS offers a large volume of breast cancer-related information that is approximately equivalent in volume to a 1000-page book. The information is offered in different formats including didactic services such as short, easy-to-understand excerpts related to living with breast cancer as well as longer articles and resource guides. Other services offer more experiential, narrative forms of information such as written accounts of how other women have coped with breast cancer and its treatments and video-based vignettes of patients sharing stories about coping with their illness. In this study, we examined three high-level information topics that subsume all of the information found within CHESS: 1) medical information focusing on treatments and side effects; 2) psychosocial information focusing on the emotional and social impact of cancer, and; 3) practical concerns focusing on the financial and legal ramifications of living with cancer.

**CHESS data**—Data from a previous CHESS study provides a unique opportunity to examine how antecedent characteristics relate to the form and type of information rural breast cancer patients seek when provided access to an ICCS. In this study, cancer patients completed a survey before receiving the intervention. They were then provided a free computer, Internet access and training on how to use the system. CHESS use data was collected as participants used the website.

### Research Aims

The C-SHIP model identifies five psychosocial factors relevant to health information seeking, however the directions of these relationships are unclear based on the existing literature. Using this model as a conceptual framework, the current study contributes to the field by investigating how these antecedent psychosocial factors relate to specific forms and topics of online cancer information seeking among rural breast cancer patients. This research is exploratory in nature, offering an initial examination of antecedent pathways. Accordingly, specific directional hypotheses are not proposed and research questions are addressed instead.

## Methods

### Participants

The data analyzed in this study was collected as a part of a larger Digital Divide Pilot Project (DDPP) in which underserved breast cancer patients in rural Wisconsin were given

access to CHESS for 4 months (Gustafson, McTavish & Stengle, 2005a; Gustafson, McTavish & Stengle, 2005b). Both pretest and 4-month posttest surveys were conducted (92% retention rate from subjects initially enrolled). The current study analyzed data exclusively from the pretest survey and use of the CHESS information services. Recruitment was conducted between May 2001 and April 2003, and subjects were paid $15 for each completed survey.

Study participants were identified through a variety of sources, including the National Cancer Institute's Cancer Information Service, the Medicaid program, hospitals and clinics, and public health departments. Participants were eligible if they were at or below 250% of the Federal poverty level, resided within one of 56 rural Wisconsin counties (as defined by Office of Management and Budget criteria), were within one year of diagnosis of breast cancer or had metastatic breast cancer, were not homeless, and were able to read and understand an informed consent letter. All study participants were loaned a computer, given Internet access for 4 months, received personal training in how to use the computer, the Internet, and, primarily, CHESS.

Table 1 shows demographic and disease-related characteristics of this sample. Study participants had a mean age of 51 years old, 67.4% of women were classified as having early stage breast cancer, and 57.7% had received at least some college education.

### Measures

Besides basic demographic information, participants answered nine primary measures at the pretest level that were further categorized according to the constructs of the C-SHIP model, as listed in Table 2. These measures have been widely tested and demonstrated in terms of reliability, validity, and responsiveness to clinical change (Brady et al., 1997; Gustafson et al., 2001; Gustafson et al., 2002; Gustafson et al., 2005). The exact wording of all the items belonging to these scales is included in the Appendix. For all measures, scores are calculated as averages across scale items.

**CHESS information services and topic use**—To keep a record of patients' CHESS use, a browser was developed by our research team to automatically collect use data at an individual keystroke level as participants used the system. This capability enabled us to log each user's code name, date, time spent, and URL of every Web page requested from our Web server database. Seven CHESS use outcomes were included in the study and described below: overall use of the Information Service component of CHESS as well as use of each of the two individual information service types, and overall use of the topics available as well as use of each of the three individual topics.

Overall use of the Information Service component of CHESS was operationalized as total time spent (in minutes) browsing the following two types of information during the four-month study period.

1.  *Didactic Services* provide science-based information to convey facts, statistics, and a review of the state of knowledge related to breast cancer and related health care. Examples include Questions & Answers (short answers to hundreds of frequently asked questions), Instant Library (full articles on breast cancer topics), Web Links (links to selected health-related Internet sites), Resource Directory (descriptions and contact instructions for breast cancer and social service organizations), and Dictionary (descriptions of medical and professional terms).

2.  *Experiential Services* provide real-life text and video accounts of patients' experiences with diagnosis, treatment decisions, and dealing with the physical, emotional, practical, and existential issues related to living with cancer.

Experiential services within CHESS include Consumer Guide (descriptions of available services, identifying a good provider, being an effective consumer of key health services), Video Gallery (video clips providing real-life accounts of people living with cancer), and Personal Stories (narrative text-based interview accounts of how others coped with breast cancer).

Overall use of the Topic component of CHESS was operationalized as total time spent (in minutes) in each of the following types of topics during the four-month study period: 1) *Psychosocial Topics* (information about psychological and social issues); 2) *Practical Topics* (financial, work and legal concerns); 3) *Medical Topics* [eighteen breast cancer-related topics including breast cancer basics, surgery (e.g., lumpectomy, mastectomy etc.) and other treatment options (e.g., chemotherapy, radiation).

**Control variables**—Control variables include basic demographic items such as age, education, and stage of cancer, found to share associations with cancer-related information seeking behavior (Johnson, 1997). Various studies have shown that younger age and higher levels of education are related to active information seeking and differ in the type of information sought. Information seeking most commonly occurs in early stages of cancer (Gotay, 1984). Stage of disease impacts information need (i.e., how novel is the situation and what decisions need to be made) and potentially how good one feels may affect her online cancer information-seeking behaviors.

### Analyses

To examine how preexisting psychosocial factors categorized by the cognitive-affective units of the C-SHIP model were associated with different types of CHESS use, partial correlation analyses were employed. For partial correlations, we statistically controlled for key demographic and illness characteristics including age, education, and stage of cancer. Thus, partial correlations among our major variables can be interpreted as unique relationships not explained by demographic and illness characteristics. Regression analyses were not performed due to two limitations: 1) significant correlations among the antecedent variables produced colinearity that would moderately affect the coefficients; and 2) the sample size would not adequately power regression analyses inclusive of our 12 antecedent variables.

## Results

### Descriptive statistics for measures

All survey measures were assessed on a five-point scale. The functional and emotional well-being scales had similar mean values of 2.45 (*SD*=.92) and 2.44 (*SD*=.94). Mean scores for need for information (*M*=2.92, *SD*=.78), participation in health care (*M*=2.98, *SD*=.53), and social support (*M*=2.92, *SD*=.85) were slightly higher than other scales. Barriers to information had the lowest mean value of 2.09 (*SD*=.96) with health information competence being the second lowest (*M*=2.35, *SD*=.65). Additionally, the mean values for health self-efficacy and negative emotions were 2.74 (*SD*=.68) and 2.87 (*SD*=.88).

During the four-month period, average time spent in didactic information services was 20.89 minutes (*SD* = 34.51), while that for experiential information services was considerably lower at 10.66 minutes (*SD* = 20.10). The mean for combined total service use was 31.55 minutes (*SD* = 50.67). On average, rural breast cancer patients spent a lot more time in medical topics (*M* = 28.87, *SD* = 51.88) than in either psychosocial topics (M = 3.25, SD = 6.47) or practical topics (M = 2.64, SD = 6.77). Subsequent analyses used the logarithm of sum of these time measures because of the positively skewed distribution of the variables.

**Correlation analyses**—Table 3 presents the partial correlations between pretest scores and types of CHESS use. After controlling for age, education, and cancer stage, significant correlations between predictors and time spent in information services and topics were ubiquitous for the C-SHIP category of cancer-relevant encodings and self-construals. Specifically, partial correlations with functional well-being were significant for total time spent, experiential and didactic services within CHESS, and time spent in psychosocial and medical topics.

For the category of cancer-relevant beliefs and expectancies, significant correlations with health self-efficacy were found in total and experiential CHESS information services, and also in psychosocial and medical topic use.

For cancer-relevant affects, emotional well-being was significantly and negatively correlated with total time spent in information services while negative emotions were positively related with time spent in experiential information services and psychosocial topics.

For the category of cancer-relevant goals and values, the need for information had a significant and positive relationship with total and experiential information seeking behaviors.

In the cancer-relevant self regulatory competencies and skills category, numerous significant correlations were identified. Partial correlations with levels of participation in health care were significant for total, experiential, and didactic uses of the information services, and also for psychosocial, practical, and medical topic use. Likewise, information competence was significantly and negatively associated with total, experiential, and didactic information service use, and again with practical and medical topic use. Perceived barriers of information had significant relationships with total and experiential information service use, and with psychosocial and practical topic use. Perceived social support was significantly and negatively associated with total and didactic information service use.

## Discussion

This study demonstrates that many of the factors specified by the C-SHIP model are associated with subsequent online cancer information seeking behaviors among rural breast cancer patients. This supports the extension of the model's applicability beyond demonstrated self-protective behavior for preventing cancer to also discerning the reasons why people afflicted with cancer may seek information to cope with their disease. While we approached these analyses with some uncertainties about the directional influences of some of these antecedent variables, our results clearly suggest that those who were in a worse condition regarding their perceived state of affairs were generally more likely to seek out more online cancer information. It is encouraging that those women who appeared to need information most were also among the most likely to seek it out.

One interesting highlight from these results is that the variables associated with the C-SHIP model appeared to have more frequent relationships with experiential as compared to didactic information seeking. This may be due to the fact that rural cancer patients are more likely to feel geographically isolated from attending face-to-face support groups and are less likely to have the opportunity to connect with other breast cancer patients facing similar issues (Curran & Church, 1999). As such, there may be a strong need among rural cancer patients to access experiential information from other cancer patients on the Internet where it is easier to find than in their own communities.

While the C-SHIP model encompasses numerous antecedent psychological and cognitive variables related to information seeking behaviors among breast cancer patients, it should be

noted that there are likely other important variables that influence the degree to which patients seek online cancer information including the cancer-related physical drivers that may contribute toward those psychosocial states. For example, fatigue resulting from cancer treatments has been found to cause significant distress among breast cancer patients (Boehmke, 2004). While we controlled for some physical indicators such as cancer stage in our analyses, it is important to remember that some of these physical states may be precursors of information seeking behaviors in their own right, and future research should continue to explore these relationships.

It should also be noted that many caregivers and companions often play an active role in seeking out online health information for their friends and family afflicted with cancer (Basch, Thaler, Shi, Yakren & Schrag, 2004). This current study says nothing of the antecedent characteristics of patients who rely on others to seek out information about their illness or the characteristics of caregivers who assume this role. Future research should explore these questions to better understand the needs of cancer patients and their caregivers to better inform education and support interventions to serve these populations.

Previous research indicates that many rural patients are medically underserved (e.g., Engelman et al., 2005). They often do not have the same degree of access to comparable health services as breast cancer patients from more populated areas. In a recent, separate study examining some of the same rural breast cancer patients, we found that the use of high-quality online health information was associated with improvements in the doctor-patient relationship (Shaw, Han & Hawkins et al., 2007). These women may seek out online cancer information to compensate for perceived inadequacies in the health education materials they receive from their healthcare providers and it may complement the information and advice they receive from their clinicians.

The current study also contributes to our understanding of why people turn to the Internet to cope with cancer, suggesting that patients may have very different reasons for accessing conceptually distinct types of services (e.g., seeking information vs. online social support) within an ICCS. Previous studies have demonstrated the efficacy of ICCSs in general (Gustafson et al., 2001, 2005a). However, there may be added benefits in examining system use at the service level as done in this study and determining the characteristics of patients who are more or less likely to use these conceptually distinct services. Such an approach is more likely to shed insights on the mechanisms underlying these effects. For instance, while the current study found that negative conditions related to patients' perceived state of affairs were generally associated with higher levels of online cancer information seeking, another recently published study looking at a separate sample of breast cancer patients revealed different patterns indicating that patients with more positive appraisals of their state of affairs were more likely to participate in the online support groups (Shaw, Hawkins, & Arora et al., 2006). While it is true that sharing information is part of what cancer patients do in online support groups (Shaw, McTavish, Hawkins, Gustafson & Pingree, 2000), they also participate in support groups for a variety of other reasons such as openly and anonymously expressing their thoughts and feelings in ways that help them make sense of their cancer experience (Shaw, Hawkins, McTavish, Pingree & Gustafson, 2006) and praying as a way to cope with their diagnosis (Shaw, Han & Kim et al., in press). In other words, motivations for using each type of conceptually distinct service may be driven by different psychosocial factors and precursors for using these different services within an ICCS may vary significantly for a cancer patient – a phenomena that will be obscured if researchers solely examine use of ICCSs at the systems level as is common in many randomized clinical trials.

It is also worth reiterating that low income rural women were recruited to this study and provided a computer, Internet access and training to use the system, at no cost. Since a recent study provided evidence that the most common barrier to seeking online cancer information among rural cancer patients was a lack of Internet access (Helft, Eckles, Johnson-Calley & Daugherty, 2005), and older, low income women in rural communities may have even less access to the Internet than many other segments of the population (Bell, Reddy, & Rainie, 2004), this study provides promising evidence about how this population of breast cancer patients might utilize online cancer information when barriers to accessing the Internet are removed. From a public policy standpoint, our results suggest that underserved rural breast cancer patients will use online health information if provided the access. Moreover, results also indicate that the psychologically neediest rural patients are among the most likely to capitalize on this opportunity. One economical, sensible solution for bridging the digital divide to assist lower income breast cancer patients in rural communities may be to create a loan bank of computers that could be provided to patients for a specified period while coping with their treatments. The computers could then be re-circulated to new patients as needed.

Given that differing antecedent characteristics are associated with preferences for different forms and topics of information, it may also be possible that people benefit from exposure to different forms and topics of information as well. While previous research has examined the benefits of access and exposure to information services in more holistic terms (e.g., Gustafson et al., 2001, 2005a; Shaw, Han, & Baker et al., 2006), future research should take a more granular approach examining who benefits from what types of information and topics to maximize the potential influence of ICCSs on patient outcomes.

While this study focused on an exclusively rural sample of breast cancer patients in Wisconsin, it should be noted that rural communities differ considerably across geographic regions of the country (Weinert & Hill, 2005). Compared to national figures, this particular sample was mostly Caucasian, reflecting the ethnic profile of much of rural Wisconsin. Additionally, over 50% of these study participants had at least some college so this sample had higher education levels than might be found in some other rural areas. Future research should examine more diverse rural communities in different geographic locations, particularly regions that might have lower education and literacy levels as patients living in these areas might have the greatest need for information while facing a cancer diagnosis.

Another limitation of this study is that the variables selected to represent the C-SHIP model only looked at patients' subjective perceptions of their state of affairs and healthcare services. As important as patients' subjective experience may be related to influencing online cancer information seeking behaviors, it is important to note that barriers to information may be very real – and not just perceived. For example, short office visits (Sepucha, Belkora, Tripathy & Esserman, 2000), as well as the fact that some healthcare professionals and institutions may not be supportive of questioning or information-seeking patients, could influence patients' propensity to seek cancer information on the Internet (e.g., Helft, Hlubocky & Daugherty, 2003). Future research should also examine these more objective, extrinsic measures related to the larger healthcare environment to complement the insights about more intrinsic variables generated in this current study.

Finally, this study looked at the entirety of online cancer information seeking behavior aggregated over four months, but previous research indicates that the timing of the desire for cancer information varies over time (Leydon et al., 2006). Future research should examine online information seeking behaviors on a longitudinal basis. The C-SHIP model successfully applied as a conceptual framework in the present study provides a valuable framework for such longitudinal investigations. The model's emphasis on the interactions of

personal and situational characteristics (Miller et al., 1996, 2001) can help generate hypotheses regarding the use of cancer-relevant information over the course of time. Insights generated from such studies may inform more sophisticated tailoring frameworks that can provide patients with the most useful information when they need it most.

## Acknowledgments

## Appendix: Question Wording

A. Cancer-relevant encodings and self-construals

**Functional well-being,** a 5-item scale. All items were scored on a 5-point scale ranging from 0= *not at all* to 4= *very much.*

1. I am able to work (including working in home).
2. My work (including work in home) is fulfilling.
3. I am able to enjoy life "in the moment".
4. I am sleeping well.
5. I am enjoying the things I usually do to relax.

B. Cancer-relevant beliefs and expectancies

**Health self-efficacy,** a 3-item scale. All items were scored on a 5-point scale ranging from 0 = *disagree very much* to 4 = *agree very much.*

1. I am confident I can have a positive effect on my health
2. I have set some definite goals to improve my health
3. I am actively working to improve my health.

C. Cancer-relevant affects

**Emotional well-being,** a 4-item scale. All items were scored on a 5-point scale ranging from 0= *not at all* to 4= *very much.*

1. I feel sad (reverse coded)
2. I feel like my life is a failure.
3. I feel nervous (reverse coded)
4. I am worried about dying (reverse coded)
5. I feel like everything is an effort.
6. I am worried that my illness will get worse (reverse coded)

**Negative emotion,** an 8-item scale. All items were scored on a 5-point scale ranging from 1= *never* to 5= *always.* How often patients had felt each of the following during the past month;

1. helpless

2. tense

3. angry

4. hopeless

5. worried

6. frustrated

7. sad

8. anxious

D. Cancer-relevant goals and values

**Need for information**, a 4-item scale. All items were scored on a 5-point scale ranging from 0 = *disagree very much* to 4 = *agree very much*.

1. I needed more information about breast cancer from the point of view of women who have had breast cancer

2. I needed more understandable information about breast cancer

3. I needed more information about the latest breast cancer news

4. I needed more contact with people who understood what I was going through

E. Cancer-relevant self-regulatory competencies and skills

**Participation in health care**, an 8-item scale. All items were scored on a 5-point scale ranging from 0= *disagree very much* to 4= *agree very much*.

1. I thought about what was going to happened ahead of time

2. I felt comfortable with how involved I was in my care

3. I understand what my doctor told me

4. Having information about my breast cancer, treatment, and prognosis gives me a sense of control

5. I prefer to have all the details (including possible risks) regarding my breast cancer and treatment options

6. I feel comfortable in asking the physician or nurse a lot of questions

7. I am confident in making decisions about my breast cancer

8. I have confidence in my doctors.

**Health information competence**, a 5-item scale. All items were scored on a 5-point scale ranging from 0 = *never* to 4 = *always*.

1. I know exactly what it is that I want to learn about my health care

2. I can figure out how and where to get the information I need

3. Health information is more difficult for me to obtain than other types of information (reverse coded)

4. I am satisfied with the way I currently learn about health issues

5. I feel that I am in control over how and what I learn about my health.

**Barriers to Information,** a 3-item scale. All items were scored on a 5-point scale ranging from 0 = *disagree very much* to 4 = *agree very much*.

1.   I wanted health information that I didn't know how to get

2.   I needed health information that I couldn't afford the time or effort to get

3.   I needed health information that I couldn't afford to pay for.

**Social support**, a 6-item scale. All items were scored on a 5-point scale ranging from 0= *not at all* to 4= *very much*.

1.   There are people I could count on for emotional support

2.   There were people I could count on when I needed help doing something

3.   There are people who will help me evaluate things I am finding out about my illness

4.   I am pretty much all alone (reverse coded)

5.   There are people who can help me find out the answers to my questions

6.   There are people who will fill in for me if I am unable to do something.

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**Table 1**

Demographic characteristics

|  | Rural women (n=144) |
| --- | --- |
| **Age** | |
| Mean (SD) | 51.81 (12.11) |
| **Ethnicity** | |
| Caucasian | 144 (100%) |
| African American | 0 (0%) |
| Other minorities | 0 (0%) |
| **Education** | |
| Some junior high | 1 (0.7%) |
| Some high school | 12 (8.3%) |
| High school degree | 48 (33.3%) |
| Some college | 39 (27.1%) |
| Associate or technical degree | 18 (12.5%) |
| Bachelor's degree | 21 (14.6%) |
| Graduate degree | 5 (3.5%) |
| **Stage of cancer** | |
| Early stage (stage 0,1,2) | 97 (67.4%) |

**Table 2**

Measures Assessing C-SHIP Model Factors

| C-SHIP Model Factor | | | | |
|---|---|---|---|---|
| **Measure** | **Citation** | **# of Items** | **Scale** | **Cronbach's α** |
| *Cancer-relevant encodings and self-construals* | | | | |
| Functional Well-being | Brady et al., 1997; Cella et al., 2003 | 5 | 0–4 | .84 |
| *Cancer-relevant beliefs and expectancies* | | | | |
| Health Self-efficacy | Gustafson et al., 2005a | 3 | 0–4 | .77 |
| *Cancer-relevant affects* | | | | |
| Emotional Well-being | Brady et al., 1997; Cella et al., 2003 | 6 | 0–4 | .86 |
| Negative Emotion | Gustafson et al., 2005a | 8 | 1–5 | .92 |
| *Cancer-relevant goals and values* | | | | |
| Need for Information | Gustafson et al., 2005a | 4 | 0–4 | .85 |
| *Cancer-relevant self-regulatory competencies and skills* | | | | |
| Participation in Health Care | Gustafson et al., 2001; Gustafson et al., 2005a | 8 | 0–4 | .86 |
| Health Information Competence | Gustafson et al., 2001; Gustafson et al., 2005a | 5 | 0–4 | .73 |
| Barriers to Information | Gustafson et al., 2001; Gustafson et al., 2005a | 3 | 0–4 | .84 |
| Social Support | Gustafson et al., 2005a | 6 | 0–4 | .88 |

**Table 3**

Partial correlation analyses: Rural women[a]

| Predictors | Time spent in information services | | | Time spent in topics | | |
|---|---|---|---|---|---|---|
| | total | experiential | didactic | psychosocial | practical | medical |
| *Cancer-relevant encodings and self-construals (1)* | | | | | | |
| Functional well-being | −.278** | −.262** | −.228** | −.189* | −.166 | −.223** |
| *Cancer-relevant beliefs and expectancies (1)* | | | | | | |
| Health self-efficacy | −.177* | −.196* | −.126 | −.177* | −.159 | −.197* |
| *Cancer-relevant affects(2)* | | | | | | |
| Emotional well-being | −.178* | −.155# | −.141 | −.141 | −.126 | −.113 |
| Negative emotions | .147 | .208* | .066 | .190* | .126 | .126 |
| *Cancer-relevant goals and values (1)* | | | | | | |
| Need for information | .192* | .166* | .148 | .116 | .093 | .116 |
| *Cancer-relevant self-regulatory competencies and skills (4)* | | | | | | |
| Participation in health care | −.252** | −.332*** | −.184* | −.233** | −.179* | −.243** |
| Information competence | −.240** | −.260** | −.194* | −.124 | −.184* | −.208* |
| Barriers to information | .172* | .207* | .132 | .190* | .128* | .099 |
| Social support | −.198* | −.154 | −.183* | −.068 | −.136 | −.154 |

Note:

[a]Control variables include age, education, and stage of cancer.

***
p < .001,

**
p < .01,

*
p < .05;

N=113–139.