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Abstract

The Internet might transform the way in which health information is communicated to patient and general populations. Understanding differences in usage patterns will be critically important to ensuring the successful distribution of health information. The present study presents early data on the use patterns and predictors of use of a Web-based intervention in a population-based subsample of women aged 18–74 in King County, WA. By three months over half (51%) of users had logged into the website, using multiple components. Predictors of use by three months included employment, perceptions of health and mental health scores. These data have implications for how to conduct Web-based intervention research and for individuals that may not benefit from such interventions.

Keywords

breast health, Internet, intervention

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Introduction

Interactive health communications are the way of the future

THE USE OF computers and the Internet have become an accepted way of American life and are already affecting health communications and decisions in powerful ways. Although the available statistics on computer and Internet usage come from many sources and are not always consistent, there is agreement on the major trend—widespread penetration into mainstream American life. Two recent reports show this. According to a report by the Employment Policy Foundation (EPF), 51 percent of Americans have computers in their homes (Employment Policy Foundation, 2001), and 43.5 percent also have Internet access (National Telecommunications and Information Administration, 2000). In December of 2000, the NielsenNetRatings (NeilsenNetRatings, 2000), showed that in US homes Internet access rose to 56 percent, 'a significant increase on last year's figure of 43 percent'. Further, 'The EPF predicts that by November 2002, 68.2 million US households will have computers, and 66.9 million will have both a computer and Internet access. By 2003, 95% of all households with a computer also will have Internet access.'

The Internet appears to be transforming many forms of communication and interaction, ranging from online shopping to the formation of new social alliances. If the Internet is going to transform the way in which health information is communicated to patient and general populations, understanding the patterns of use and reasons for use will be critical in building a public health Web-based vision of health information for all.

Use of the Internet for seeking out health information

Ultimately, the Internet may become a more important channel for the dissemination of specialized and individualized information than more traditional communication channels (such as health care professionals or mass media channels). A report from the Pew Charitable Trust's Internet and American Life Study—*The online health care revolution: How the Web helps Americans take better care of themselves*—offers a compelling profile of the current adopters of this technology. Fifty-two million American adults, or 55 percent of those with Internet access, have used the Web to get health or medical information (Pew Foundation Report, 2000). We call them *health seekers*. A majority of health seekers go online at least once a month for health information. Our previous research found that out of 14 interpersonal and impersonal sources, only one information source—the Internet—was significantly and positively related to women's self-reported awareness of genetic testing for breast cancer risk (Meischke, Bowen, & Kuniyuki, in press).

A great many health seekers say the resources they find on the Web have a direct effect on the decisions they make about their health care and on their interactions with doctors. A total of 48 percent of these health seekers say the advice they found on the Web has improved the way they take care of themselves, and 55 percent say access to the Internet has improved the way they get medical and health information. Additionally this study showed that a majority of health seekers describe their health as less than ideal. Those users in less-than-excellent health were likely to have sought information for themselves rather than other people. Those in excellent health were more likely to seek advice on behalf of someone else (Pew Foundation Report, 2000). This suggests that perceived health status may affect the extent and direction of the Internet information search. This is consistent with other studies on cancer information seeking, which have also found that greater perceived general health status, perceived risk of getting cancer and personal experience with cancer in one's environment were positively related to information seeking from impersonal as well as interpersonal channels (Johnson & Meischke, 1992, 1993; Johnson, Meischke, Grau, & Johnson, 1992; Meischke & Johnson, 1995).

Many factors could affect Internet use, and understanding these factors is important for several reasons. First, the Internet represents a relatively new but readily accessible and rapidly growing source of information about health. We have little or no scientifically collected data on how people use the Internet, when they use it and why they do and do not use this vast resource. Second, the unique properties of *electronic* health communications might allow the

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creation of new forms of communication, not just additional quantities of information. If managed correctly, these properties (such as interactivity, flexibility, immediate feedback, etc.) might help us focus these new forms of communication to improve health outcomes in ways significantly over and above the provision of information; however, exposure to health information is not likely to be due to accidental exposure, like one might receive while watching television. Information seeking from the Internet is likely to be a purposeful and effortful search. For these reasons, studying the early ways in which people use the Internet might yield options for future intervention and future research. It is important to find out what motivates people to log on and search for health information even when their need for information is not urgent or extensive at the moment. If the Internet is going to be useful for reaching large, possibly uninvolved audiences with health information, we need to understand what motivates people to seek out health information from this new medium.

The present study will present the initial usage rates and predictors of the use of our study website in a population-based sample of women aged 18–74 recruited to a randomized trial of a website intervention. First, we present the patterns of use among women randomized to the intervention arm of the randomized trial. The purpose of this trial was to test the effects of a specially designed website on breast cancer risk information, screening behaviors, perceived risk of breast cancer and quality of life. We focused on first use, not reuse or repeated use of the site, given the lack of long-term follow-up data at this point in the trial. Then we present data on the reasons for non-use in the sample, gathered during an interview with the non-users. Finally, we identified predictors of website use with multivariate models.

Experimental methods

Participant recruitment and assessment

Participants for this study were recruited for a larger intervention study of provision of breast cancer risk education via the World Wide Web. We purchased a list of names and contact data from Mailing Lists Plus, a local research survey and list company. The requirements for the list were women aged 18–74 with contact information in a geographically defined area in King County, WA. We selected a broad age range of women because our previous research indicated that most women, independent of age, were concerned about their breast cancer risk. We mailed initial consent letters to samples of participants, requesting them to contact us if they did not want to receive a survey call. We telephoned potential participants, collected basic eligibility information (age as above, no previous diagnosis of cancer, intent to live in their residence for one year), described the study and invited participation. We also asked about access to the Internet as an eligibility question. Specifically, we asked, ‘Do you currently have access to the Internet or the World Wide Web?’ If yes, we asked whether the access was from home, work or some other location. For this article, we defined a participant as ‘having access’ if they had access from their home. Due to the personal nature of the participant’s risk information available through the website, we did not recruit women who only had access from work. If the participant agreed and was eligible, she completed the baseline.

Baseline surveys were completed over the telephone by trained and monitored interviewers. The interview lasted about 45 minutes and consisted of several sets of questions relevant to the breast cancer risk-education study.

Participants who did not log on to the study website within three months of receiving access were contacted by phone by one of the study health counselors. The health counselor described the website features and made sure that the participant had all of the necessary information to access the website (website address or URL, user name, password). The counselor also asked the participant if she would be willing to answer a few questions to help us learn more about what motivates women to use the website. We called these questions the non-user survey. Eighty-three women agreed to complete the non-user survey, which consisted of 11 open-ended questions. To code the qualitative data, we first read through the responses to each question to identify common categories or themes. We then coded for each category.

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Finally we ordered the categories according to frequency mentioned.

Description of the intervention

The Web-based intervention had multiple components, including information tailored to personal risk factors, interactivity with others, information about breast cancer and links to other sites. Fig. 1 shows the components of the website and the percent of participants who used the components by the three-month point. We included an online personal risk sheet, based on the model developed by M. Gail (Gail, Brinton, Byar et al., 1989) to predict personalized lifetime risk estimates for each participant. We used data from the baseline survey to generate estimates for each participant. These estimates were presented numerically and graphically, based on our risk sheet presentations used in a previous counseling project (Burke, Culver, Lowry, Durfy, Bowen, & McTiernan, 2000). Average risk women were able to access their personal risk graph immediately after logging onto the site for the first time. Mixed and genetic risk women were prompted to sign up for a counseling session to review their risk sheet. Their risk sheets were not viewable on the website until they completed the counseling session. Our genetic counseling colleagues did not want women with a high-risk value to receive their information without support and opportunity for questions; however, we found ways to discuss risk with these higher risk participants, such as the telephone, so that all participants eventually received their risk information.

The website had three main content categories: About Breast Cancer, Early Detection and Prevention. The 'About Breast Cancer' category included information on breast cancer and breast cancer risk. The 'Early Detection' category included information on breast self-exams, clinical breast exams and mammography. The 'Prevention' category included information on exercise, healthy eating and Tamoxifen.

There were a variety of interactive features in the website. Participants were given the opportunity to make 'breast health commitments' based on information they provided in the baseline survey. For example, a participant who reported eating less than five servings of fruits and vegetables per day could commit to eating more servings of fruits and vegetables each day. A participant who reported already eating five servings could commit to continue eating at least five servings per day and exceeding that when possible. Participants could also complete interactive worksheets to make and review exercise and healthy eating goals. For example, participants could enter intermediate and long-term exercise goals. Their goals were saved on the website so they could review them at any time.

The website contained quizzes for assessing eating patterns and exercise motivations. Participants could complete the quizzes and received scores that provided feedback on how to improve their eating and exercise habits.

There were three interactive features that allowed participants to select 'concerns' that may have kept them from doing mammograms, clinical breast exams and breast self-exams. The participant clicked a button next to the concern that sounded most like her, and a suggestion appeared for addressing that concern. Each of these interactive features was accessible through the appropriate website section and on the Health Action Plan. The Health Action Plan combines all of the interactive features into a single set of plans for future health activity so a participant can easily review all of her goals and worksheets.

Participants had access to the latest breast cancer news and information through the Health News section, the Questions and Answers section and the Other Websites section. The Health News section was updated approximately once a week with relevant health news articles. The Questions and Answers section was an archive of answers to questions asked in our previous breast cancer risk information study. This section was also updated with new questions and answers from the current study. The Other Websites section included links to other websites that had related information on breast cancer risk, early detection and prevention.

Participants contacted study staff through the following contact forms on the website:

- *Ask an Expert*: Participants used this form to send a question to the health expert. A response was sent within two business days. Participants could specify whether they wanted their response by e-mail or phone.
- *Counseling Sign-up*: This form was for study participants to sign up for a counseling

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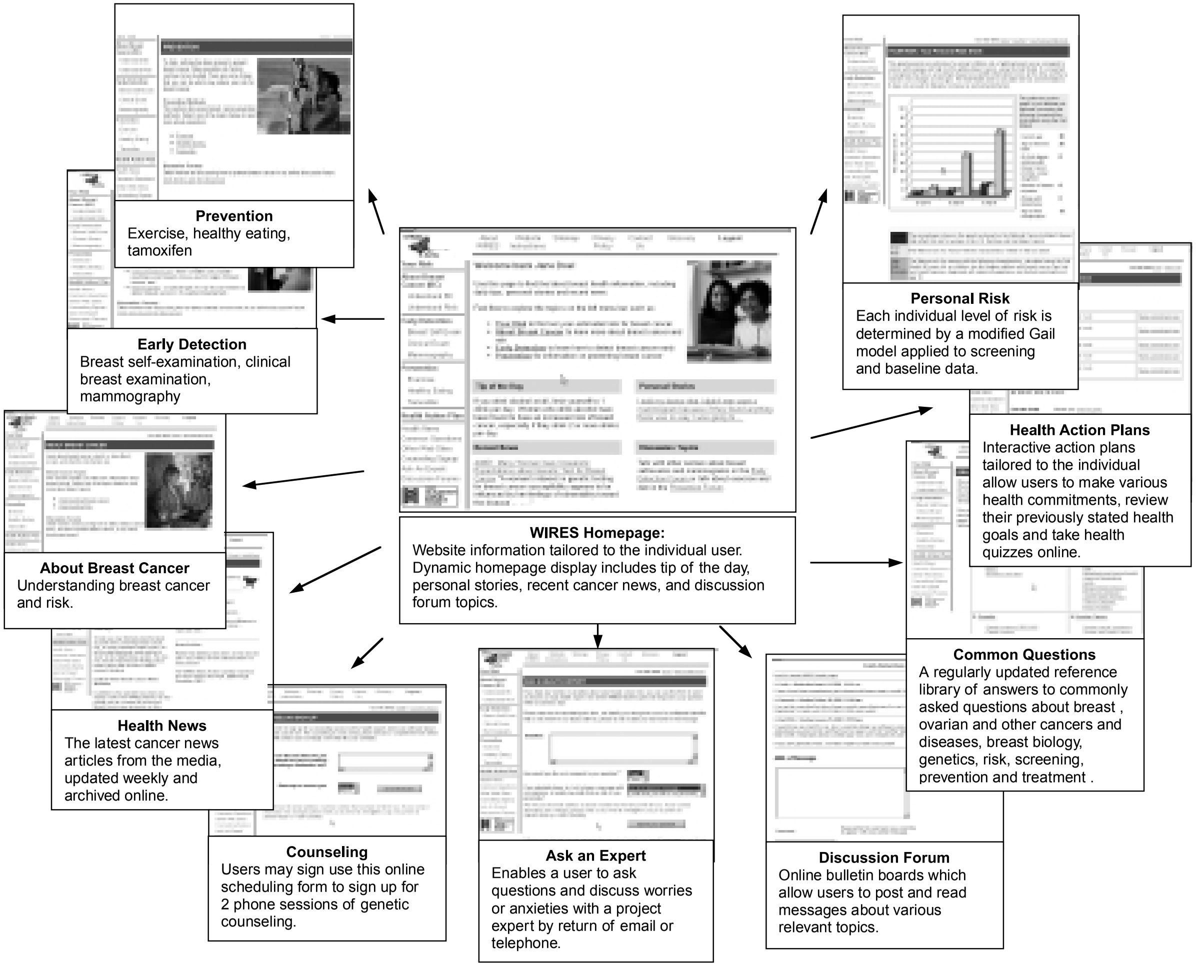

WIRES Homepage:
Website information tailored to the individual user. Dynamic homepage display includes tip of the day, personal stories, recent cancer news, and discussion forum topics.

Personal Risk
Each individual level of risk is determined by a modified Gail model applied to screening and baseline data.

Health Action Plans
Interactive action plans tailored to the individual allow users to make various health commitments, review their previously stated health goals and take health quizzes online.

Common Questions
A regularly updated reference library of answers to commonly asked questions about breast , ovarian and other cancers and diseases, breast biology, genetics, risk, screening, prevention and treatment .

Discussion Forum
Online bulletin boards which allow users to post and read messages about various relevant topics.

Ask an Expert
Enables a user to ask questions and discuss worries or anxieties with a project expert by return of email or telephone.

Counseling
Users may sign use this online scheduling form to sign up for 2 phone sessions of genetic counseling.

Health News
The latest cancer news articles from the media, updated weekly and archived online.

About Breast Cancer
Understanding breast cancer and risk.

Early Detection
Breast self-examination, clinical breast examination, mammography

Prevention
Exercise, healthy eating, tamoxifen

Figure 1. Key sections of the WIRES website.
Notes:
The information and presentation on the website is determined by each individuals personal characteristics.
1. Personal Risk level 2. Exercise level 3. Eating habits—fat and fiber (fruit & veg) intake 4. Mammogram history—within previous 2 years 5. Age (greater or less than 50)

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session. Counseling was available to any participant who requested it. Mixed and genetic risk participants must have completed counseling in order to view their personal risk sheets.

- *Contact Us*: Participants could use this form to contact us for any reason. We also included the phone number of the study line, if the participant preferred to contact us by phone.
- *Discussion Forum*: Participants had the opportunity to write messages to all participants at any time of day or night using a forum, which anyone could access and then respond to. Previous studies with this type of basic technology have shown that persons often send messages in the middle of the night when they cannot sleep because of anxiety (Taylor, Gustafson, Hawkins, Pingree, McTavish, Wise, & Carter, 1994).

The website included information on the study, the project team and our privacy policy. It also included instructions on how to use the website, with a section entitled 'Website use for beginners' that targeted novice Internet users. A site map listed each page in the website and allowed participants to go directly to a specific page by clicking on the link. A glossary defined scientific terms that may have been used in the website or in other website links.

Women who were at mixed risk, determined by having a high cancer worry score or a previous biopsy, were offered psychosocial counseling. The group psychosocial counseling consisted of two sessions conducted in groups of five or six women led by a trained Health Counselor. Participants received their personal risk sheets during the counseling sessions. The key elements of the group counseling intervention were the group format, interactions with other women, a focus on stress management and social support and emphasis on health and coping.

Women who were at genetic risk, defined by standard criteria, received genetic counseling. The genetic counseling protocol for the proposed study had four sessions, based on the standard model of multiple sessions for genetic susceptibility testing for breast cancer (Biesecker, Boehnke, Calzone, Markel, Garber, Collins, & Weber, 1993; Botkin, Croyle, Smith, Baty, Lerman, Goldgar, Ward, Flick, & Nash, 1996).

Measures

We measured demographic variables (age, race, income, education, marital status, employment status and health care coverage) with simple single items used in our previous research projects.

We measured quality of life using the RAND 36 (Hays, Sherbourne, & Mazel, 1993), a well-validated, widely used instrument that assesses several aspects of quality of life, including physical, social and psychological functioning. It consists of 36 items measuring participant responses to eight subscales or elements of quality of life. The RAND instrument has been used in both longitudinal follow-up of quality of life over time and in intervention studies where quality of life has been hypothesized to change with the intervention activities. This instrument is sensitive to relatively small changes in general functioning, and allows for the reporting of a broad range of levels of functioning. We selected the mental health and the health perceptions subscales from the pool of eight to use in the present article.

We assessed health care coverage, because the potential for type of health insurance coverage to predict ability to obtain screening and counseling is documented in the literature. We modified questions from the Women's Health Initiative (Behavioral Science Subcommittee, Women's Health Initiative, 1997) to measure a participant's access to health care and type of financial support for her health care. We asked, 'Do you have any health care coverage?' with response categories of: Blue Cross/Blue Shield; A pre-paid plan, such as an HMO; Medicare; Medicaid; the VA; or Other.

We asked six questions modified from the Women's Health Initiative about risk factors for breast cancer, including reproductive and breast health history. Questions included age of menarche, age at first live birth, history of breast biopsy and current menstrual status. We estimated risk for breast cancer from these questions using the Gail model for risk appraisal (Gail et al., 1989). The Gail algorithm results in a probability of developing breast cancer by a specified age or in the woman's lifetime on a scale of 0–100 percent.

To measure perceived risk, we asked participants, 'What do you think your chances of getting breast cancer are?' on a scale of 0 to 100

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(0 meaning no chance and 100 meaning definitely).

Analyses

We first downloaded data from the website database to identify and tabulate the proportion of first users and non-users at two critical time points post randomization: three weeks and three months. At each of those time points we cued the participants via e-mail or telephone (participant choice) to use the website. We also tabulated use for a short time after the reminder to see if the reminder had any impact at all. We then coded and summarized the data on reasons for non-use at the three-month follow-up point. Finally, we predicted use at three months using multiple logistic regression, where ever use was coded as 1 and non-use was coded as 0. Predictors included demographic variables examined earlier as well as perceived and actual breast cancer risk, mental health and perceptions of health.

Results

Response rates and demographic description of participants

We mailed 5021 letters to potential participants and completed 2517 telephone interviews to determine eligibility. Of these telephone participants, 1449 (54%) were eligible for the present study. Reported reasons for ineligibility (*N* = 1069) included lack of Internet access at home (57%), not living at Seattle for one year (7%), age other than 18–74 (5%) and history of breast cancer (10%). Of the eligible participants, 1350 have been recruited into the present study, for an ultimate response rate of 82 percent using the methods according to the American Association of Public Opinion Research (aapor@org). Of these participants, 71 percent are in the average-risk group, 14 percent are in the mixed-risk group and 15 percent are in the high-risk group. This analysis will present data from the 268 participants in the intervention group who have been in the study for six months (post randomization).

Participants in the present study were primarily White (88%), married or partnered (45%), of lower to middle income (42 percent with household incomes of 50K or over) and moderately educated (56 percent had at least a college degree). Comparisons with 2000 census data for the targeted geographic regions indicated that these data were very comparable and therefore, these participants are similar to women in the geographic areas from which they were recruited.

Usage patterns of the study website

Table 1 shows the rates of first use of the study website at key assessment points during the intervention. As seen in this Table, by three weeks only one-fifth of the participants (21.5%) had logged into the website. The three-week cue seemed to increase the first use, almost doubling the proportion of users to 37.2 percent of participants. Almost half of the participants (47.6%) had used the website by three months, with an additional 30, or 10.4 percent using in the most recent time period. The use slightly increased after the three-month cue, adding an additional 3.4 percent. Finally, 22 users logged in after four months to bring the ever-used rate up to 58.7 percent by six months.

The website programming also allowed us to identify the length of use per log-in event and the places on the website that were used most frequently. The average length of each visit was 30 minutes. The most frequently used Web

Table 1. Proportion of first use at key measurement points and prompts in intervention women

	Cumulative use		*Use in this stage*		*Did not use*	
Stage of participation[a]	*N*	%	*N*	%	*N*	%
Up to 3 weeks (*N* = 288)	62	21.5%	62	21.5%	226	78.5%
Up to 6 weeks (with 3-week cue)	107	37.2%	45	15.6%	181	62.8%
Up to 3 months	137	47.6%	30	10.4%	151	52.4%
Up to 4 months (with 3-month cue)	147	51.0%	10	3.4%	141	49%
After 4 months	169	58.7%	22	7.6%	119	41.3%

[a] All times are counted from the day of notification mailing to the participants

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pages were, in this order, the home page, the page that details personal risk information, the exercise and healthy eating pages and then the information pages on breast cancer, risk factors and Tamoxifen use. The most common path at first use was for the person to go to the home page, then move to the personal risk display and then move on to the other informational and interactive pages.

Results of the qualitative interview

The qualitative interview at the three-month point provided reasons for lack of Web use in this study. We asked the women why they had not yet logged on to the study website. The main reason given for not logging on to the website was being too busy, usually due to work or family responsibilities. Women also reported a variety of personal and work-related events that had prevented them from logging on. Personal events included illness, moving, marriage, traveling, death in the family, childbirth, concern for a family member overseas and remodeling a house. Work-related events included preparing for a presentation and organizing a conference. Others did not feel comfortable using their home computers on their own and needed assistance with accessing the Internet. Some had forgotten the study website address or their user name and password information. Some were not concerned about their breast cancer risk. Others simply said that logging on was not a priority.

We also asked women what was the most difficult part of getting online. The most common response was 'finding time'. Women also reported technical difficulties with getting online, such as a having a slow Internet connection or problems with their service provider. One woman commented, 'my connection is so slow, I don't feel like bothering'. An additional woman reported that having to compete with other household members for use of the computer or phone line was a difficult part of getting online.

Relationship of background factors to website use

Use of the website was related to demographic variables, as shown in Table 2. Income and employment were both significantly related to three-month use, in that more women with higher income and who were employed full time were less likely to use the website. Other demographic variables, such as age, race, partnership status or health care coverage, were not significantly related to use by three months post notification.

Table 3 presents the results of a multiple logistic regression to predict website use at three months post notification, where use was coded as 1, and non-use was coded as 0. The significant predictors of use at three months were current full-time employment, mental health and perceptions of current health. Of the demographic variables entered into the regression equation to predict use at three months, only employment status significantly predicted use. Women who were employed full time were less likely to use the website. Three additional psychological variables predicted use at three months post notification. Women with higher mental health scores were more likely to use the website, and women with lower perceptions of their general current health were less likely to use the website. Perceived risk predicted use in that individuals with higher perceptions of personal risk for breast cancer were more likely to use the website. These variables were not significantly correlated in the present sample.

Table 2. Demographic profiles of women who did/did not log onto the study website at 3 months ($N = 228$)

	Did log on	*Did not log on*
Above 40 years	48%	36%
College educated and above	61%	53%
Married/partnered	53%	42%
White	88%	87%
Household income of 50K or over[a]	38%	53%
Full-time employment[a]	42%	78%
Has health care coverage	85%	87%

[a] $p < 0.05$

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Table 3. Predictors of website use three months after randomization in a population-based sample of women ($N = 228$)

Predictors	*Odds ratio*	*Confidence interval*
Age (40 and older = 1)	1.3	1.0–1.5
College educated (yes = 1)	1.2	.9–1.7
Marital/partner status (Yes = 1)	1.1	1.0–1.3
White (yes = 1)	.9	.2–1.5
Household income (50K or over = 1)	1.3	.5–2.0
Employment (full time = 1)	.3[a]	.1–.8
Health care coverage (yes = 1)	1.1	.9–1.9
Mental health[b]	2.0[a]	1.5–2.4
Perceptions of health[b]	.4[a]	.2–.7
Perceived risk	2.5[a]	1.8–3.1

Notes:

[a] significant predictors; $p < 0.05$

[b] Higher scores on these variables mean higher mental health or higher perceptions of health

Discussion

The most surprising thing about the data presented in this article, to our investigator group, is that participants do not all immediately log in to the website provided by the study. This lack of engagement came after all participants agreed to be in a study involving the use of a website and agreed to use the website as part of their consent process and study participation. This certainly goes against what we hypothesized to happen, in that in our counseling studies we had high attendance rates at the counseling sessions and everyone reported interest in using the materials and the opportunity to talk about breast cancer risk (Bowen, Christensen, Powers, Graves, & Anderson, 1998). The explanation for this difference might be in the recruitment procedures. In our previous counseling studies we had recruited a self-selected group of individuals, all interested in their breast cancer risk. In the present study, we proactively recruited from the general population, trying for a sample that could be generalized to the population from which the women were recruited. We did not select participants for an interest in breast cancer risk or breast cancer information in the present study, but simply asked whether the participants would fulfill the study requirement. So the issue of breast cancer risk, screening or related health behavior change might not be as relevant to this group, and they might not use the website as faithfully as previous research suggests.

On the other hand, the unique properties of the Internet may lend itself to differing use rates and patterns. The always-available nature of the World Wide Web and the Internet may remove urgency from any thoughts of use, especially because there was no assumption of any sort of health problem that could cue use. Perhaps using the Internet is still difficult enough that less motivated people may not want to seek out this medium for obtaining health information. These hypotheses are testable, and could speak to the need to make information searches easier and more attractive for less involved audiences. The use rates at four months ultimately overtook use rates for more traditional interpersonal or paper-based interventions, where the audience is a selection of the general public, such as smoking cessation groups or dietary change materials. Therefore, using the Web to deliver a public health intervention may ultimately be more effective, compared to other modalities, when the use rates can be calculated over time and there is little urgency to have participants use right away.

The limited evaluation possible here on the use of e-mail and telephone cues to increase use of the website suggests that externally provided cues can certainly remind people of the website and its attributes but that other mechanisms might also account for use.

Women give a variety of reasons for not logging on, and we need to work on reducing these barriers so we can stimulate Internet searches for less involved audiences. The first cue, provided at three weeks, almost doubled the number of first uses of the website by

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participants, but the second cue, even accompanied by an interview collecting reasons for non-use, only raised the number of users by a few percent. We cannot tell from these data as to whether cues or time (and accompanying real-life cues) ultimately increased the number of users. Again, this would be an appropriate topic for further research, in a randomized trial of cues versus no cues. But from the existing data it would seem that both cues and time are responsible for increases in use from notification to six months post notification letter. Therefore, other environmental changes probably play a role in website use and study-driven cues can only help in a limited fashion.

The reasons for non-use collected during the interview at three months provide a complicated picture of the reasons for non-use. The most common reasons for non-use focus on the pattern of life demands and complications of the women who did not use. Our website was pilot tested using reasonable procedures to insure high usability, readability and relevant information. Even so, being too busy to get to it was the primary reason for non-use, and 'more time' was reported as the thing most needed to increase use. One of the difficulties with prevention information and consideration is that it is often not tied to a specific health event or health problem and needs to be used every day or week, with little symptom relief or feedback as to its efficacy. Perhaps a general breast cancer-related information and support website falls into the category of simply being nice to know about but not essential. We hypothesize that use rates would be different in a group of women with recently diagnosed relatives (less than three months) because the more recent cue might be motivating to learn about breast cancer and to obtain support for breast health choices. In a secondary analysis, we compared ever use rates in this sample between women who had relatives with breast cancer diagnosed less than one year ago ($N = 35$) versus women who had relatives with breast cancer diagnoses over one year ago ($N = 92$). Women with recent family diagnoses used at a higher rate, 76 percent, compared with women with more distal family diagnoses, 49 percent. These data are not definitive but point to one pattern of use that should guide consideration in choice of intervention timing: participants are more likely to engage in using interventions when it is salient or relevant to them and their lives. Certainly women with breast cancer themselves show higher use rates and more immediate use when the website is provided, compared with our participants (Taylor et al., 1994). This could be due to the incredibly salient event of a breast cancer diagnosis, compared to the relatively far off and probabilistic event of a possible future breast cancer diagnosis that our participants are facing.

The data presented on patterns of use are encouraging, compared to the data on actual use numbers. Women who used were interested in their personal risk and in exploring preventive options, such as dietary change, exercise and use of Tamoxifen. This is positive in that certainly prevention messages and efforts are likely to be helpful in reducing the breast cancer public health burden. Research into behavioral methods of preventing cancer is a relatively new field, and as more behavioral and chemopreventive agents are endorsed and prescribed by medical and public health professionals, the public will likely need assistance in choosing among options and in tailoring multiple options to meet the risk-based and personal needs of individuals. This tailoring is something that interactive health communications systems do well; they can be made to change rapidly and accurately in response to new discoveries, and the information and support for new options can be widely disseminated. Therefore, this model of intervention can be considered a future tool for prevention, as choices become more complicated.

The demographic correlates of use, and ultimately the predictors of use, provide related reasons for explaining use. Consistently being employed full time was a deterrent to using our website. We considered the idea that being employed full time might actually be supportive of use, particularly if the place of employment was associated with computer use; however, this finding, coupled with the reasons for non-use as lack of time to sign onto the website, again point to priorities other than breast cancer risk and prevention information as being real barriers to use.

Two psychological variables, high mental health and low perceptions of health, were significant predictors of use in the opposite direction. These data indicate that women are

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not likely to log into a website for general support and improvement of feelings but that concerns about specific health problems may play a role in the likelihood of use.

Taken together, these variables contribute to an understanding of a picture of a woman who uses the website. She needs to have time to log on and read Web documents, she is likely to be relatively mentally healthy and finally, she might have minor health problems that lower her overall judgments of her own health status. Perhaps she has the resources to not work, or perhaps she has simply the time to attend to her own health needs. She is relatively functional, in that she is not depressed or anxious, but relatively mentally healthy in general; however, she has some concern about her health and might therefore be willing to act on this concern by using the website. These speculations can drive future investigations, in that people who feel vulnerable perhaps need assistance and support that a website can provide, and interventions can address this vulnerability.

At least two issues will arise when this project website is made available to the general public. First, there are other places on the Web where one can obtain personalized risk information. We are tracking use of such alternative websites and will report on this use in future articles. A related issue involves helping people to select among a varied and confusing number of websites, selecting high-quality sites while rejecting inaccurate or unhelpful ones. There is currently no easy solution for this issue, but we hope that by carefully evaluating Web interventions we can eventually label such scientifically sound products with a 'seal of approval' from a learned or policy making body. Then the public will have assistance in making important choices.

This study has clear limitations that need to be considered when interpreting the findings. First, the study is only of adult women under 74, and therefore we have learned little about older women's use patterns. We offered the participants a single website, on a single topic (breast cancer). This focus may not attract the interest of everyone, and concern about many of the health issues of interest to a general sample of women will not be addressed here. There may be regional variation in the use patterns of Web-based information that we are unaware of. We need to learn more about women around the country and, indeed, the world, before making generalized statements about Web use for health support. We did not measure the specifics of the process of using the website and so will not have data on which pieces women preferred or found most useful. Finally, we know nothing of the health seeking issues of women who do not have access to the Internet and therefore were not eligible for our study. This group, while shrinking, may be a more complicated group than we ever imagined (Wilkins, 1999) and therefore needs our attention immediately, due to the digital divide that new technological communications devices currently have (Hoffman, Novak, & Schlosser, 2000). This public health priority must be addressed to allow equitable and useful information and support to reach all potential users.

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