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PREDICTORS OF WOMEN'S INTERNET ACCESS AND INTERNET HEALTH SEEKING

**Deborah J. Bowen, Hendrika Meischke, Nigel Bush,
Jean A. Wooldridge, Robert Robbins, Abi Ludwig,
and Gina Escamilla**
Fred Hutchinson Cancer Research Center, Seattle, Washington, USA

A random, population-based sample of 431 women aged 18–74 in King County, Washington, USA, completed a survey module on Internet use and access. Level of mental health, level of general health perceptions, older age, and higher income predicted women's health-related Internet use. Participants without access reported various barriers to obtaining access; perceived lack of usefulness of the Internet as an information source and unfamiliarity with using this technology appear equally important reasons as financial cost for not adopting the Internet. Internet use motivators are complex; these findings have relevance to the design of Internet-based interventions.

INTRODUCTION

Access to the Internet Among Americans

The use of computers and the Internet has become an accepted way of American life and already is 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. According to a recent Harris Poll, 66% of all U.S. adults (137 million) are now online. This includes 55% of all adults who access the Internet from home, almost a third (30%) who access it from work, and almost one in five who go online from a school, library, cyber café, or other location (Harris Interactive, 2002a). Further, the Employment Policy Foundation predicts that, "by 2003, 95% of all households with a computer also will have Internet access" (Employment Policy Foundation, 2001).

Not all Americans have participated in the explosive uptake of new technology, however. Groups that are underserved in other ways (e.g., health care and economic opportunities) also lag in the use of computer technology. In the latest edition of the National Telecommunications and Information Administration's (NTIA's) "Falling Through the Net" (NTIA, 2000), the most comprehensive assessment to date of the digital divide, some gains in access were found for underserved ethnic, economic, and other groups. Despite this gain in access, a digital divide remains along predictable lines. While applauding a general increase in U.S. digital inclusion, *Falling Through the Net IV* showed that there is still a consistent disparity by gender as well as by income, race and ethnicity, age, and disability (Anderson, 1999; Becht, Taglang, & Wilhelm, 1999; The Digital Divide Network, 2002; Hoffman, Novak, & Schlosser, 2000; National Association for Equal Opportunities in Higher Education, 2000; Neiman & Chabran, 1999; NTIA, 2000).

Use of Internet for Seeking Out Health Information

Ultimately, the Internet may become a more important channel for the dissemination of specialized and individualized materials, such as health information, compared with more traditional communication channels such as health care professionals or mass media channels. At least 80% of online adults now look for health information online (Harris Interactive, 2002b), with more than 70,000 websites currently disseminating health information (Cline & Haynes, 2001). The recent 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," profiled current adopters of this technology and found that a majority of health seekers go online at least once a month for health information (Pew Foundation, 2000). 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, 2001).

Why Study the Internet?

Many factors could affect Internet use. Understanding these factors is important for two reasons. First, the Internet represents a relatively new, but readily accessible and rapidly growing, source of information about health. 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% of these health seekers say the advice they found on the web has improved the way they take care of themselves, and 55% say access to the Internet has improved the way they get medical and health information (Meischke et al., 2001). Second, the unique properties of *electronic* health communications might allow the creation of new forms of communication, not just additional quantities of information. If managed correctly, these properties (e.g., interactivity, flexibility, immediate feedback) might help us focus these new forms of communication, which could improve health outcomes in ways significantly over and above the provision of information. For these reasons, studying the ways in which people use the Internet might yield options for future intervention and future research in health communications.

The Internet appears to be transforming many forms of communication and interaction, ranging from online shopping to the formation of new social alliances. We need to understand more about women's access issues in order to provide access that closes the gender gap and is comfortable and usable for women. If the Internet is going to transform the way in which health information is communicated to patient and general populations, then women must have access in order to not be left out of new communication opportunities. Understanding issues in women's access will be critical to ensuring the successful distribution of health information. Identification of barriers will be important in predicting and guiding the diffusion of this technology for the dissemination of health communication (Rogers, 1995).

The present study will present predictors of Internet access and Internet health use in a population-based sample of women aged 18 to 74 years. First, we present the patterns of access to and perceived utility of the Internet among women from the general population. Next we focus on health uses of the Internet by looking at demographic and personal health characteristics of health seekers versus nonhealth seekers. Finally, we identify predictors of access and health use with multivariate models, using the bivariate analyses to guide us.

EXPERIMENTAL METHODS

Participant Recruitment and Screening

Participants for this study were recruited for a larger intervention study of provision of breast cancer risk education. 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 to 74 years with contact information in a geographically defined area of King County, Washington state. 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. If the participant agreed, she completed the baseline survey. We completed 2,123 screening surveys, and of the 1,934 eligible individuals, we completed 1,366 baseline surveys for this study for a response rate of 70.1%.

Survey Administration

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. A random sample of 431 participants were selected to complete a module dealing with Internet use and access. We examine the responses to the Internet module and focus on Internet use and access, reasons for use, barriers to Internet access, and potential future uses of the Internet for women who currently do not have access.

Internet Measures

We measured access to the Internet using questions from a recent Kaiser/National Public Radio survey on Internet access (National Public Radio, 2000). 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 either at home or at work because of the relative ease of home or work access compared with access at, say, a community center.

We asked about frequency of Internet use (used not at all, a few times in the last month, about once a week, or every day or two). We

asked about the participants' reasons for using the Internet, using yes/no responses to 14 specific purposes (e.g., to send and receive e-mail, to get health or medical information). We defined a participant as "health seeker" if she reported home or work access and indicated that she used the Internet to get health or medical information.

For individuals who told us that they did not have access, we asked for their endorsement on a four-point scale (agree, agree slightly, disagree slightly, or disagree) to a list of 16 potential barriers to Internet access (e.g., computers are unnecessary luxuries, "I can't afford to buy a computer"). Finally, for individuals without access we asked about their potential future use of the Internet by asking if they would use the Internet for each of the same 14 purposes as above, with yes/no responses to each.

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-item Health Survey (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 eight in the RAND survey to use in this article.

Analyses

We first performed simple descriptive statistics (*t* tests and chi-square tests) on Internet access and health use to determine patterns of use. Next, we performed bivariate statistics on functions of the Internet (i.e., on the perceived utility of the Internet) for data from participants with access. For those without access, we analyzed perceived barriers to use. Finally, we performed logistic regression to predict Internet access among all survey participants, and for those with access, we performed similar analyses on Internet health use. In each case we used a consistent set of predictor variables including quality of life measures and demographic measures.

RESULTS

Participants in the present study were primarily White (88%), married or partnered (45%), of lower to middle income (42% with household incomes of 50K or over), and moderately educated (56% had at least a college degree). Comparisons with 1990 census data for the targeted geographic regions indicated that these data were very comparable; therefore, we believe that these participants represent the geographic areas from which they were recruited.

A total of 79% of participants reported access to the Internet. Of those participants with access, 87% reported access at home, and 68% reported having access at work. For this sample, most women with access had it at both home and work.

Individuals with access reported a wide range of Internet use frequency, with 6% using it not at all, 14% using it a few times in the last month, another 14% about once a week, and fully 66% claiming use every day or two. In Table 1 we compare demographic data for women with access and women without access.

Of the seven demographic factors studied (age, education, marital status, race, income, employment, and health insurance), five showed a significant relationship to Internet access. Women with access are significantly younger, more likely to be college educated, to be married or partnered, to have higher incomes, and currently to be engaged in full-time employment. The only factors that did not show a significant correlation were race and health care coverage. Our sample, like the population from which it was drawn, is predominantly White; this makes it difficult to detect a race effect, should one exist.

Table 1. Demographic profiles of women with and without access

	With access	Without access	% totals
Age (mean, sd) screening*	45 ± 10.5	56 ± 12.1	—
Percent college educated and above*	63%	30%	56%
Percent married/partnered*	52%	23%	45%
Percent White	88%	91%	88%
Percent with household income of 50K or over*	50%	20%	42%
Percent with full-time employment*	71%	47%	66%
Percent with health care coverage	98%	90%	96%

*$p < 0.05$.
With access $n = 339$; without access $n = 92$.

Functions of the Internet

In Table 2 we present uses of the Internet reported by women who do and do not have access to the Internet. For women with access, the data are reported current uses. For women without current access, the data are reported potential future uses should they ever obtain access to the Internet. As seen from these data, there are many similarities between the actual use of the Internet by those with access and the anticipated use of those who might access the Internet in the future. Similarities occurred for e-mail, health, travel, entertainment, and information on current events. Differences between women with access and women without included use for shopping, playing games, and work purposes.

Barriers to Internet Use

In Table 3 we present frequencies of barriers endorsement by women who currently do not have access to the Internet. The first observation

Table 2. Uses of the Internet for individuals with access (current uses) and individuals without access (future uses)

	Proportion indicating "yes"	
	Individuals with access	Individuals without access
	Current use	Future use
Education/school	53%	67%
Pay bills	11%	13%
Financial record	20%	14%
Investments	21%	17%
Shop*	49%	28%
Current events	78%	87%
Entertainment	69%	75%
Travel	79%	65%
Chat rooms	4%	9%
Play games*	21%	33%
Adult entertainment	1%	7%
Work purposes*	57%	34%
E-mail	92%	86%
Health/medical information*	71%	87%

*$p < 0.05$.
Current use $n = 339$; future use $n = 79$.

Table 3. Barriers to Internet use for individuals without access ($n = 79$)

	Frequency			
	Agree	**Slightly agree**	**Slightly disagree**	**Disagree**
Can't afford computer	27%	11%	8%	54%
Can't afford monthly fees	30%	4%	8%	58%
Can't get phone line	6%	0%	3%	91%
Don't want computer	28%	9%	1%	62%
Don't like new technology	13%	11%	3%	73%
Internet isn't useful	25%	8%	2%	65%
Computers cause nerves	17%	1%	1%	81%
Don't know how to use	30%	6%	3%	61%
Don't know where to buy	4%	4%	0%	92%
Computers are unnecessary	10%	5%	4%	81%
Don't know what internet is	6%	3%	0%	91%
No useful info on web	2%	0%	4%	94%
Info on web is kept private	27%	9%	6%	58%
Info too offensive	22%	9%	0%	69%
Info too inaccurate	12%	9%	4%	75%

is that barriers related to the economics of access, such as not being able to afford a computer or access costs, are only endorsed by approximately one-third of the nonaccess participants. Other variables, such as the Internet not being useful or not wanting the Internet, were endorsed as frequently as were financial barriers. The following barriers were endorsed very infrequently: access to a phone line, knowledge of where to buy computers, and knowledge of the Internet.

Multivariate Predictors of Access and of Internet Health Use

In Table 4 we present the multivariate analyses predicting access to the Internet using the demographic variables, mental health, and general health perceptions as predictor variables. Here access is coded as 1 and nonaccess as 0. Of the nine predictor variables, three are significant in the multivariate analyses: lower age predicted access, and higher household income and married/partnered status both positively predicted access. The other variables in the equation were not significant predictors of access in the multivariate analysis.

In Table 5 we present predictors of using the Internet for health or medical purposes among individuals who currently have access to the

**Table 4. Predictors of Internet access in a population-based
sample of women ($n = 424$)**

Predictors	Odds ratio	Confidence interval
Age (40 and older = 1)	.2*	.06–.3
College educated (yes = 1)	1.1	.0–1.0
Marital/partner status (yes = 1)	1.8*	1.2–2.7
White (yes = 1)	.9	.9–1.0
Household income (50K or over = 1)	2.7*	1.1–4.2
Employment (full time = 1)	1.2	.8–1.5
Health care coverage (yes = 1)	1.0	.9–1.3
Mental health (high = 1)	1.3	1.0–1.9
General health (high = 1)	1.0	.8–1.2

*Significant predictors; $p < 0.05$.

Internet at home or work or both. Age was again a significant predic-
tor, but in the opposite direction: older participants were more likely to
use the Internet to access health information. The other significant de-
mographic predictor was income, again in a positive direction, in that
higher income individuals were more likely to use the Internet for health
information. Two health-related variables predicted use of the Internet:
level of mental health and level of general health perceptions. In the case
of mental health, lower levels of mental health predicted use of the In-
ternet for health-related reasons. Women with higher levels of perception
of their general health used the Internet more for health-related purposes
than did women with lower levels of health perceptions.

**Table 5. Predictors of Internet health use among women who
have access to the Internet ($n = 351$)**

Predictors	Odds ratio	Confidence interval
Age (40 and older = 1)	4.3*	2.9–5.8
College educated (yes = 1)	1.0	.1–1.1
Marital/partner status (yes = 1)	.9	.2–1.7
White (yes = 1)	1.0	1.0–1.1
Household income (50K or over = 1)	2.0*	2.1–3.5
Employment (full time = 1)	.9	.8–1.3
Health care coverage (yes = 1)	1.1	.9–1.2
Mental health (high = 1)	.2*	.11–0.7
General health (high = 1)	1.9*	1.6–2.8

*Significant predictors; $p < 0.05$.

DISCUSSION

The data presented here indicate a very high level of access for women in the Seattle metropolitan area. This finding agrees with recent surveys, which indicated that Seattle has generally higher access rates than do many other parts of the country (NTIA, 2000). When home access is combined with work access, the overall access rate in this sample is almost 80%. This value indicates the pervasive nature of the Internet in current households and means that the availability of the Internet could allow for interventions to be transmitted to large segments of the public.

Women reported a broad range of uses for the Internet. E-mail was the most frequently reported use among women with access and also the most desired use among women without access. Many of the reported uses involved seeking information about current events, travel, and health. This supports the idea that the Internet can serve as a virtual reference library—a place for many people to go when they need assistance.

Women without direct access reported a broad range of barriers to obtaining access, and many of these were not directly financial in nature. Some of them seemed to indicate a belief that the Internet is not useful enough to warrant the expense of access; this finding is supported by discussion in the literature of a lack of interest in gaining access among individuals without access (Wilkins, 1999). That is, our findings and the literature suggest that many women without access believe that access is not worth having. This could represent some compensation for the inability to gain access (i.e., if I cannot get to the grapes, they must be sour), or it might represent a real indifference to the technology. Additional work would be required to tease apart these possibilities.

Prior research on the diffusion of innovations suggests that beliefs around the perceived advantages of an innovation over the status quo are an important feature for adoption of an innovation (Rogers, 1995). For some of the women in this sample this relative advantage of the Internet did not seem to be established. In considering methods of improving access we must consider the range of barriers that people present and be prepared to overcome them.

Consistent with other literature on information seeking, income was positively related to seeking health information from the Internet (Johnson, 1997). Interestingly, in the Pew Internet and American life online life report (Pew Foundation, 2000), no income differences are reported for health seekers and nonhealth seekers online. This study did also find that health seekers were proportionally more middle-aged than young or

old, with the highest proportions of usage showing up in those between the ages of 30 and 64.

The result that mental health variables predicted Internet health use is also very intriguing. Whereas mental health and perceptions of general health were not related to Internet access in general, both were predictors of Internet health use among women with access. General health perceptions were positively related to health use, meaning that women who described themselves as generally healthy used the Internet for health more frequently, compared with women who described themselves as unhealthy. The opposite was true for mental health: Women with lower mental health scores used the Internet for health more frequently. This indicates that feeling or being sick may not be a large motivator for Internet health searches. Indeed, one of the largest health uses may be for friends and family members who are ill and in need of health advice. Mental health scores may be reflective of general distress, and this means that in times of distress, women may turn to the Internet for health information. These relationships were not necessarily causal in nature due to the cross-sectional nature of the design. More longitudinal research is necessary to determine if distress cues searching for help with health issues via the Internet.

There were several limitations to the current study that need to be considered when using these data. First, the study contained only women and tells us nothing about the access patterns or use reasons in men. Because the study was carried out as a component in a larger research project about breast cancer risk, the participants in this study already had agreed to participate in a survey about breast cancer risk factors and an intervention to inform women about their risk; therefore, there likely will be bias in who agreed to be in the study and consequently completed this survey. This bias would most likely tend to favor those who are interested in seeking health information and to be against those who avoid health information.

The sample was almost entirely Caucasian. Although census data show that this sample was representative of the regional population from which the sample was drawn, the lack of inclusion of other ethnic groups limits the general applicability of the results to a more diverse population.

In summary, the closing of the gender-based digital divide may depend on the financial as well as the psychological cost of adoption of this communication technology. In this study, however, women's perceived lack of usefulness of the Internet as an information source and unfamiliarity with using this technology appear to be equally important reasons as financial cost for not adopting the Internet. Interventions to highlight the usefulness of the Internet and to help women become more comfortable with Internet technology might reduce the digital divide.

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