

Internet Embeddedness: Links with Online Health Information Seeking, Expectancy Value/Quality of Health Information Websites, and Internet Usage Patterns

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Abstract

To see how the Internet is actually embedded in our lives, this exploratory study examines how Internet users search the Web for important information, especially health or medical information, to make critical decisions, and the perception of how intimately our lives are embedded in the Internet intersects with patterns of health information seeking online and the expected quality of health information websites. Data from a probability sample of 569 Internet users found four types of commonly sought health information clusters online which included information on (a) health improvement, (b) medical treatment, (c) family health, and (d) health issues that are difficult to talk about. Results also show that behavior or behavioral intentions in health information seeking are in fact either a function of value expectancy or the evaluation of health information websites. More importantly, people who often go to the Internet for health information and have high expectations of the value and quality of health information websites (especially in terms of reliability, relevance/context, and interaction) tend to be those who are more likely to perceive the Internet as playing an important role in life decisions or rate the Internet as more embedded in their lives.

Internet Embeddedness

INCREASINGLY, PEOPLE ARE MORE RELIANT ON THE INTERNET TO achieve a whole range of daily activities—whether it is shopping, banking, learning, staying in touch with family, socializing with friends, just taking time out to play games or listen to music, or getting help with health-related issues. Although the Internet has become an important resource for health information, little is known about key factors that affect our perceptions of how the Internet is embedded in our lives and how our lives are embedded in the Internet. Moreover, our heavy reliance on the Internet is often taken for granted. In evaluating how the Internet is embedded in our lives, Howard uses the embedded media perspective to describe how deeply our social and individual lives are involved in the Internet.¹ British writer Tom Standage, in his book *The Victorian Internet*,² describes technological embeddedness in terms of ‘invisible technology’—meaning that “technology has matured to become so embedded in, or integrated to, our everyday lives that we don’t really notice it any more.”^{2(p63)} Howard explains that the capacity and constraints of an online social life can be conceived in terms of three dimensions: *fit*, *status*, and *link*.¹ In terms of *fit*, the Internet is embedded in that it fits in well with the daily rou-

tines of our social lives without demanding changes in our old habits. This means that the Internet has become entrenched and immersed in the background and surroundings of our everyday lives, and we would find it difficult to give up. With respect to *status*, the question is how we can use our ability to integrate the Internet into our lives to improve our social position and quality of life by using information to increase our understanding. Finally, the concept of *link* measures how effectively and efficiently the Internet enables (or constrains) us to link to the outside world as compared to traditional media.

Health Information Seeking Online

Health information seeking behavior can be characterized as the search for and receipt of information that helps “to reduce uncertainty regarding health status” and “construct a social and personal (cognitive) sense of health.”^{3,4,5} Although television and other traditional media sources play pivotal roles in much of health information dissemination, the Internet may be taking over this function. During the late 1990s, the Internet exploded into a powerful social institution,⁵ and is now heavily relied upon for medical information on health-related topics by both consumers and providers of

health care services.⁶ Although a multitude of online health information websites exists, there is little consistency in terms of how many people actually use this information, the purpose of using it, the types of health information sought, and the implications of this usage. Thus, we pose the following research question and hypothesis:

RQ₁: What specific types of health information do people seek through the Internet?

H₁: High Internet health information seekers will rate themselves as more embedded in the Internet than low health information seekers.

The Expectancy Value Paradigm

The expectancy-value approach suggests that “people orient themselves to the world according to their *expectation* (beliefs) and evaluations.”^{7(p275)} Expectancy-value judgments affect intentions to use media and the frequency of use mainly through their influence on attitudes.⁸ Similarly, expectancy values or perceived quality attributes of health information websites will influence people’s use of the Internet for health information.

The quality of information on health websites has been a prominent topic in medical and information science research. Frequently, the discussion has been restricted to an examination on one dimension of expectancy value or quality, namely the *reliability*, of health information in terms of its accuracy, trustworthiness, currency, and authoritative-ness.^{9,10,11,12} Meanwhile, a growing body of recent research on Internet-based health communication suggests that the *completeness* of health and medical information is perhaps one of the most important expectancy values or qualities in decision making and choice situations.^{13,14,15,16} In a study on the quality of health information on the Web, Marton identified another important attribute—*relevance*, which is an important dimension of information source quality, and its inclusion in Web user studies contributes to academic and health care practitioner discourses on the quality of online health information.¹⁷ As Marton pointed out, health information can be highly reliable but completely irrelevant if it does not take into account the characteristics or the needs of the information seeker. Specific to this issue, Saracevic describes five attributes of relevance,¹⁸ including relation, intention, context, inference, and *interaction*. Therefore, based on the concepts of Internet embeddedness and the expectancy value judgment framework, together with the mutually reinforcing relationships between health information seeking behavior and its antecedents, we raised two hypotheses and a research question:

H_{2a}: Subjects who score high on expected value/quality of online health information are more likely to seek health information from the Internet.

H_{2b}: Subjects who score high on expected value/quality of online health information are more likely to perceive the Internet as playing an important role in their lives.

RQ₂: What are the relative influences of demographics, health information seeking behaviors, expected value/quality of health information websites, and Internet usage pat-

terns in predicting the role the Internet plays in making important decisions in life?

Methods

Sample and sampling procedure

Data for this study were collected from a telephone survey with a probability sample of 1,076 respondents aged 18 or above, randomly chosen from the latest telephone directory in Hong Kong. The survey instrument was pilot tested before the actual fieldwork on 42 university students, which took place August 22–26, 2006. All eligible respondents included for analyses were PC users and had access to the Internet at home. Traditionally, past research on health information online examined only those who had sought health information within 12 months prior to the survey. However, this study included all Internet users because the aim of this research was to assess the perceived embeddedness of the Internet in people’s lives—involving not only how much they rely on the Internet for health-related information, but also the Internet for information on school, career training, job search, making investments, and developing lasting relations. Of the 1,076 completed interviews, 52.9% were Internet users and 47.1% were nonusers. Of the 569 Internet users, 51.7% were male and the mean age category was between 39 and 40 years of age. The response rate was 55%.

Measurements

A total of six questions were asked to assess Internet embeddedness (i.e., how crucial the Internet had been in some important decisions or life changes?). A 10-point scale was used with 1 = “no role at all” and 10 = “a crucial role.” Based on past literature, *health information seeking* was measured with a total of 15 items in this study to assess the types of health information Internet users usually seek online.^{19,20,21} A composite health information seeking index was created by adding all 15 items to illustrate the intensity of health information seeking via the Internet. The reliability alpha was 0.90. As for *expectancy values of health information websites*, a collection of 11 items taken from previous research into the quality of health information on the Web was used.^{22,23,24} Three specific quality attributes (reliability, relevance/context, and interaction) of health information websites were examined. Similar to Internet embeddedness and health information seeking, a composite index was also devised with data ranging from 11 to 55 and a reliability alpha of 0.89. *Internet usage patterns* were assessed by asking respondents how often they use a list of six Internet-related functions. Each subject was then assigned an Internet usage intensity index (i.e., the sum of these six variables with data ranged from 6 to 30). The reliability alpha was 0.78. Finally, *social demographic* variables were included as control variables.

Results

With the exception of “link,” which was measured by a single item “developing a lasting relationship and/or finding romance,” the mean scores for the five items to measure both “fit” and “status” were all above 7.3. It shows first that the notion of relying on the Internet to help find jobs and schools “fits” well with their daily routines. Second, it sug-

TABLE 1. CORRELATION BETWEEN HEALTH INFORMATION SEEKING, INTERNET EMBEDDEDNESS, EXPECTED VALUE/QUALITY OF HEALTH INFORMATION WEBSITES, AND INTERNET USAGE INTENSITY

	2	3	4
1. Health information seeking online	0.16**	0.09*	0.37***
2. Internet embeddedness		0.46***	0.23***
3. Expected value/quality of health information online			0.25***
4. Internet usage intensity			

* $p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$; $N = 534$.

gests that people have integrated the Internet into their lives to help seek and obtain health information in order to improve and maintain good health, and to help make intelligent decisions about ways to invest in order to enhance their social and economic "status." Third, the Internet can also provide a means for people to "link" with the outside world more efficiently and effectively, especially for establishing long-lasting relationships.

Factor analysis results yielded a four-factor health information seeking structure which included: *medical treatment, hard to talk about health issues, family health, and health improvement*. Although past research has demonstrated that people are increasingly using the Internet to obtain health information, the majority still prefer to use doctors, pharmacists, and nurses as their main sources of information. This result is consistent with the Pew Report which emphasizes that most people in the United States only infrequently search for health information on the Internet.^{25,26} This means that the Internet has become, albeit slowly, a popular resource for health information.

As shown in Table 1, a significant correlation result was found between the composite indexes of online health information seeking and Internet embeddedness. This indicates that the more people benefit from health information via the Internet the more they perceive that the Internet is playing an important role in their lives or the more they feel that their lives are embedded in the Internet. As a result, H1 was largely supported.

Results in Table 1 also show that behavior or behavioral intentions in health information seeking was indeed a function of value expectancy or an evaluation of health information websites. These findings are in line with previous re-

TABLE 2. HIERARCHICAL REGRESSION OF DEMOGRAPHICS, HEALTH INFORMATION SEEKING ONLINE, EXPECTANCY VALUE/QUALITY OF HEALTH INFORMATION ONLINE, AND INTENSITY OF INTERNET USE ON INTERNET EMBEDDEDNESS

	Internet embeddedness ^a		
	r	β	ΔR^2
Block 1: Demographics			
Age			
Gender (male = 1)			
Household monthly income			
Education			0.00
Block 2: Health information seeking			
Medical treatment	0.16**	0.12*	
Hard to talk about health issues	0.12*		
Family health	0.12*		
Health improvement			0.01*
Block 3: Expected value/quality of health information websites			
Reliability	0.36***		
Relevance/context	0.37***	0.21**	
Interaction	0.38***	0.19**	0.12**
Block 4: Internet usage intensity ^b			
Web search	0.30***	0.26***	
Online news	0.19**		
e-mail			
Instant messaging (ICQ, MSN)	0.16**		
Blogs			
Forums			0.10***
R^2		0.24	
Final adjusted R^2		0.23	

^aRespondents were asked to rate how important the Internet has played in roles about some important decisions or changes in life (e.g., get information on school, university, or career training, help find jobs, and get information to deal with a major illness). Scale used: 1 = no role at all and 10 = crucial role.

^bHow often do you engage the following interact activities (e.g., e-mail, MSN, forums, blogs, online news, and research)? Scale: 1 = Never and 5 = Very often.

Figures are Pearson's r and standardized beta coefficients.

* $p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$; $N = 534$.

search and show that media consumption is affected by an individual's control and perceptions of the probability and value of a potential consequence.²⁷ Therefore, H_{2a} was modestly supported. As hypothesized in H_{2b}, data support that subjects who score high on expectancy value/quality of online health information are positively and significantly linked to Internet embeddedness. Similarly, results in Table 2 show that distinct dimensions of expectancy value/quality of health information websites and Internet embeddedness are all significantly related. This suggests that people who believe and experience online health information as reliable, accurate, relevant, easy-to-use, basic, nontechnical, interactive, and having feedback mechanisms for user support are those who perceive that the Internet plays an important role in their lives. These results strongly support H_{2b}.

Results in Table 2 indicate that no demographic variable was a significant predictor of Internet embeddedness. In fact, the Internet has become widely used by all socioeconomic strata; it is equally important or embedded for all demographic groups.^{28,29} The most powerful predictor is from the Internet usage pattern block, with Web search being the strongest. This means that, of all the Internet services, being able to search for information on the Web has a vital impact on Internet embeddedness perceptions or the perceived importance of the Internet in helping us to make important decisions. Relevance/context and interaction were also two significant predictors in the expected value/quality of health information website block. This finding implies that the easier the medical information for nonmedical professionals is to understand, the more basic and nontechnical the language is in the interface, and the more emotional support is available through interactive feedback mechanisms, the more Internet users perceive that the Internet is embedded in their lives. As for the health information seeking block, only medical treatment was a significant predictor. This indicates that being able to obtain health or medical related information online strongly affects our perceptions of how embedded we are in the Internet.

Discussions

The results of this study show that, although it is still uncommon, Internet users do perceive the Internet as an alternative source of information for health problems. With this information, they might be able to avoid a visit to a health professional. This is in stark contrast to traditional health care services, where the burden is on the user to attend at a time usually determined by a professional. Moreover, the Internet provides a means of minimizing people's perceived barriers to accessing health service/information—reducing embarrassment and providing *anonymity*, especially for health-related information that is sensitive and private in nature—and also being *empowered* to have more control over their health decisions and to get access to support groups.^{4,30} With these benefits, it is easier to explain why and how health information seeking is having observable influences on Internet embeddedness in our lives.

This study shows that those who often go to the Internet for health information and have high expectations of health information websites tend to be those who are *more* likely to perceive that the Internet plays an important role in life decisions. This suggests that there is a crucial link between In-

ternet embeddedness and online health information seeking. In fact, the information obtained enabled high health information seekers to 'challenge aspects of care' and 'weigh the pros and cons' of treatment.

Furthermore, it is important to note that expectancy values of health information website, especially in *relevance/context* and *interaction*, were significantly associated with perceived Internet embeddedness. Such results point to the importance of health information websites for nonprofessionals being in nontechnical language, searchable, free, and with feedback and interactive support if the Internet is to serve as a "leveler" across different socioeconomic backgrounds, as such information seeking experiences may lead to the perception of being empowered and make people feel more reliant on the Internet.³¹

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The author has no conflict of interest.

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