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eHealth Promotion: The Use of the Internet for Health Promotion

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Setting the Stage

eHealth is playing an increasingly large role in the lives of Americans,[1] and the Internet has great potential to become a low-cost and effective source of health promotion interventions. Computer-based programs combine the advantages of a clinic approach, which emphasizes individualized interaction between the client and the provider, with the goals of the public health approach, which targets large population segments or an entire population. Interactive technologies can be more enticing to participants because of the potential to receive individualized, tailored feedback[2,3] and to interact at their convenience.[4] They also hold the promise to increase retention rates by giving participants doses of interventions as they need them.[5] Other advantages of eHealth promotion programs include reduced personnel demands, consistency of interventions over time,[6] increased interactivity and flexibility, automated data collection,[2] and the potential for more honest self-report by participants.[2,6] Therefore, delivering effective and cost-effective interactive health promotion interventions would be greatly facilitated by increased reliance on eHealth applications.[5]

This edition of *The Art of Health Promotion* examines the use of eHealth technologies for health promotion, the obstacles of use, and how to overcome these obstacles. The contents of this edition include:

- The growth of the Internet
- eHealth and health promotion
- Use of the Internet for health promotion
- Online health promotion information
- Evaluation of eHealth promotion interventions
- Evaluation tools for eHealth promotion
- Application of evaluation tools to online websites
- Population use of eHealth promotion

The Growth of the Internet

Although there has been much attention on the struggles of dot-com firms and the digital divide, the Pew Internet & American Life Project reports that the overall number of individuals using the Internet continues to increase.[7] It is estimated that as of May and June 2005, 68% of the adult U.S. population (137 million) used the Internet. That number represents an exponential increase over the estimated 9% of users (17.5 million) in 1995.[8] As the Internet population has grown, the digital divide has been narrowing. However, Americans age 65 and older, African-Americans, and those with less education continue to lag behind in Internet use.[7] A new type of digital divide has also

been created by different access speeds. The Pew Internet & American Life Project now splits Internet access in the United States into three tiers: those truly offline (22% of adults), those with relatively modest connections such as dial-up (40%), and those who are the highly wired broadband elite (33%).[7] Approximately eight out of 10 Internet users have used the Internet to search for health information.[8]

eHealth and Health Promotion

The concept of eHealth has gained momentum within health care in recent years, but surprisingly little has addressed the issue of health promotion within eHealth. In a recent communication of the Commission of the European Communities, eHealth was described as tools or solutions for both health professionals and personalized health systems for patients. Examples included health information networks, telemedicine services, personal wearable and protable communicable system, electronic health records and health portals.[9] Eng[1] provides a more specific definition of eHealth as the use of emerging technologies and, in particular, the Internet to enhance health and health care. More recently, a review of 51 published definitions of eHealth summarized two common themes: "health" and "technology."[10] No other common themes emerged. Given the great number of published definitions of eHealth, surprisingly little reference is made to the use of these technologies in the health promotion field, defined as "the science and art of helping people change their lifestyle toward a state of optimal health."[11] However, the absence of the term does not automatically imply that the technology has not been utilized in health promotion.

Use of the Internet for Health Promotion

There are several ways in which the eHealth technology and the Internet have been used within the health promotion field. The first involves professional develop-

ment. Several published studies have examined the use of the Internet for distance learning and continuing education.[12,13] Second, the Internet has served as a research tool for a variety of studies for recruitment of participants and for data collection. The use of Internet-based surveys has been the focus of design studies,[14,15] as well as studies aiming to reach specific populations.[16,17] The third way, and the focus of the remaining sections of this edition, is the use of the Internet and eHealth as an intervention channel. This includes the distribution of health information, as well as interventions or applications aimed at helping individuals make changes in their health. Several factors that are converging to facilitate the rapid expansion of eHealth promotion applications include the rapid proliferation of technology and increased availability of computers; faster modems, digital technologies such as digital subscriber line (or DSL), high-speed processors, very large and fast hard drives, and constantly improving browsers[18]; the relatively low cost of delivering eHealth interventions[2]; the increase in the public's willingness to more actively manage their own health[4]; and the willingness of the public to use the Internet as a tool for health.[19] The increasing reliance on eHealth applications is also reflected by the inclusion of objectives in Healthy People 2010 related to strategically using communication to improve health, increasing Internet access to homes, and increasing the proportion of sites that disclose information that can be used to assess the quality of the site.[20]

Online Health Promotion Information

The number of Americans looking for health or medical information online grew from 46 million in 2000 to 73 million by December 2002.[21] In 2002, on average, those who looked for health care information online did so three times every month.[22] Half of these individuals said access to information on the Internet had improved the way they took care of themselves. Furthermore, many reported that the material they gathered directly affected their decisions about getting treatment for their illnesses.[23] According to the Pew Internet & American Life Project,[7] 8 of 10 (79%)[8] American Internet users have searched for information on at least one major health topic online, which is the same portion as in 2002. This translates into approximately 95 million American adults who use the Internet to find health information. Similar to 2002, certain groups of Internet users are the most likely to have sought health information online: women, Internet users younger than 65, college graduates, those with more online experience, and those with broadband access.[8] When comparing the health topics searched online in 2002 with those in 2004, diet and nutrition (44% in 2002 vs. 51% in 2004) and exercise and fitness (36% in 2002 vs. 42% in 2004) showed the greatest growth in people seeking information. According to Fox,[7]

although many online health-information seekers had specific purposes because of pressing medical issues, the increase in searches for information about diet, fitness, and exercise suggests "that online health seekers are increasingly interested in wellness information and material that could be unconnected to worrisome symptoms, a doctor's diagnosis, or another kind of health crisis." The report offers several explanations why so many Internet users may be searching for certain types of information, including government agencies' calls for more awareness of obesity and an increase in public education about nutrition. In addition, many health-related websites are now supplying more content that might drive users toward certain topics.

Evaluation of eHealth Promotion Interventions

Much has been written about the potential for eHealth initiatives to revolutionize health promotion and disease management by improving intervention quality at considerable cost savings.[2,4,19,24] In particular, there has been a great deal of attention on the potential for eHealth technology to facilitate the development and dissemination of interactive, tailored, multimedia behavior-change programs.[2,5] The excitement about this potential, however, is often appropriately couched in caveats about the quality and effectiveness of the applications.[19] The "eHealth knowledgebase," as Eng[1] refers to it, is just beginning to emerge. In addition to questions about whether or not the programs are effective, there are concerns that programs may do harm[19] and that the already-limited health care dollars could be wasted on programs with limited or no outcome data. Many national groups, including the Robert Wood Johnson Foundation and the Science Panel on Interactive Communication and Health, have repeatedly emphasized the need for more evaluation research in this area.[19,24,25] However, there have been few studies examining the quality of interactive behavior-change programs on the Internet and even fewer investigations of the effectiveness of such programs. The evaluation research conducted to date has been limited by (1) the inclusion of small, select samples that are not representative of entire populations; (2) quasi-experimental research designs; and (3) an overreliance on process rather than outcome measures.[1]

Evers et al.[26] conducted a review of the literature to examine the status of empirical and evaluative research on the impact and efficacy of Internet programs on health behavior. Internet-based health behavior interventions were defined as programs that resided on an Internet or Intranet. Although 169 articles were retrieved for the review, only 34 publications met eligibility criteria (i.e., included an Internet-based intervention). The publications were divided into descriptive studies and research studies.

Of the 19 descriptive studies, 7 reported no results; 9 included usage information such as number of users, average time on the site, most popular part of the site, and demographics of users; and 8 included evaluative or qualitative feedback. Of the 15 research studies, 13 reported randomized control trials (RCTs) and 2 reported nonrandomized group comparisons (quasi-experimental designs).

The results of the research studies were promising. Eleven of the 15 studies showed significant effects.[27–36] Outcome measures ranged from self-reported postoperative pain, quality of life, scores on established psychological measures, hospitalizations, health care utilization, measures of headache pain and physical activity, eating disorder scales, and weight loss indices. Only four of the studies[37–40] showed no significant effects of the intervention. These four were all RCTs that included computer-mediated counseling. These interventions were not completely tailored to the Internet and in some ways simply represented a different delivery channel for established counseling programs. Recruitment and retention of participants in Internet-based programs is of critical importance. Decline in usage and number of times logged on to the system over time was evident in many of the studies. Harvey-Berino et al.[39] found that participants in a face-to-face, therapist-led group were significantly more likely to attend sessions than were those in an Internet-only group.

Overall, the results of the review indicated that although many researchers believe the Internet to be an important communication channel for health behavior and promotion programs, very few studies have been conducted examining the efficacy of such programs. The majority of the published research has provided descriptions of programs in addition to usage and evaluation data. A few research studies have been reported, with the majority of them being RCTs. The RCTs that were designed specifically for the Internet seemed to have the best results. Programs that simply use the Internet as a delivery channel to provide the same counseling or programs as used with other delivery channels were not as successful. The review was not able to examine the cost effectiveness of such interventions, as only one study included cost effectiveness as a measure. The widespread acceptability of the Internet was another important finding; a variety of populations like using the Internet and report having no problems using it. Use and satisfaction with the programs were high.[26]

There have been several studies published since this review was conducted, including examples in nutrition,[41] physical activity,[42] and smoking.[43] A meta-analysis was conducted in 2004 to examine the effectiveness of web-based vs. non–web-based interventions on behavior-change outcomes.[44] Citations between the years 1996 and 2003 from several databases were searched, and 22 articles were found to be appropriate for the study. Effects-size

comparisons in the use of web-based interventions when compared with non–web-based interventions showed an improvement in outcomes for knowledge and behavior change for several different behaviors.

Evaluation Tools for eHealth Promotion

Although several guidelines for evaluating health on the Internet have been published, few of those include specific criteria relevant to the area of health promotion, health behavior change, or disease management and have been designed more specifically for websites that provide health information. Cummins et al.[45] conducted a review of 20 published guidelines, evaluation tools, and journal articles with explicit criteria for assessing health-related websites. The criteria were sorted into major and minor subcategories, and those that were most supported among the established guidelines were selected. The goal was to focus on behavior-change content and its impact and to address common Internet-usage concerns such as privacy and usability. The review provided a very good start to developing full review criteria; however, it lacked specific criteria relevant to health promotion or health behavior change.

Two studies have turned to the Public Health Service's *Treating Tobacco Use and Dependence: Clinical Practice Guideline*[46] to create an adapted set of screening criteria specific to health promotion and health behavior on the Internet. The "5 A's" portion of the Public Health Service's guidelines represent five major, but brief, intervention steps that can be used in the primary care setting for those patients who use tobacco. Bock et al.[47] developed the Smoking Treatment Content Scale (STS-C) to assess the key components of smoking-cessation treatment as described in the Public Health Service's guideline for the evaluation of 46 smoking-cessation websites. In addition, the Smoking Treatment Ratings Scale (STS-R) was developed to numerically rate the quality of coverage for each of the topic areas of the STS-C. Finally, the Smoking Treatment Usability Scale was developed to measure the quality of usability for the system.

To apply similar criteria across a variety of behaviors, Evers et al.[48] adapted the Public Health Service's guidelines more broadly for health behavior change on the Internet (HBC-I Screener and Expanded). The "5 A's" represent generic counseling steps that can be used for most health behavior risks and that form the basis for the development of brief criteria for the basic elements needed in Internet programs designed for health promotion or health behavior change. The criteria were more extensively adapted for the HBC-I than for the previously developed evaluation tools. These criteria do not ensure efficacy for behavior change; rather, they are assumed to provide the minimum criteria for a program to have the potential for producing behavior change.

The original intent of the first of the tobacco "5 A's," *Ask*, was to systematically identify all tobacco users and ensure that every patient's tobacco-use status was asked and documented. Because websites appear to inherently assume that a visitor has a specific concern related to the content of the site (e.g., the visitor to a smoking-cessation site wants to quit smoking or help someone quit smoking), the *Ask* criterion was not included in the HBC-I.[49]

The second strategy, *Advise*, involves practitioners urging tobacco users to quit. For the HBC-I guideline, this was expanded to include advising the individual about a particular behavioral risk and about the need to change the behavior.

Assess is the third strategy, in which practitioners assess a patient's willingness to quit. There are many variables (e.g., self-efficacy and psychosocial variables) for the variety of behaviors for which programs exist on the Internet that are important for providing appropriate strategies for the individual. Therefore, within the HBC-I, *Assess* was expanded to include the assessment of many possible variables that could affect behavior change.

The tobacco-specific *Assist* criterion was divided into two separate criteria for the HBC-I. The first, *Assist*, includes providing support, understanding, praise, and reinforcement; describing intervention options; negotiating intervention plans; and providing general assistance in making changes. This assistance should include the tailoring of messages based on the assessment from the Internet *Assess* criterion. The second criterion, *Anticipatory Guidance*, was derived from the tobacco *Assist* strategy and anticipates triggers or challenges that can lead to relapse. The adapted HBC-I *Anticipatory Guidance* criterion includes providing counseling for potential relapse problems and addressing issues of relapse prevention.[49]

Arrange Follow-up for tobacco includes scheduling at least one future contact and suggesting further steps to take during that contact. The HBC-I version includes arranging a follow-up session, reaffirming a plan of action, advising when it would be best to come back to the program, and advising about an appropriate type of follow-up even if the program itself might not provide it.[49]

Application of Evaluation Tools to Online Websites

The STS-C and STS-R were used to evaluate 46 smoking-cessation websites. Researchers found that over 80% of the websites that were evaluated did not include one or more of the key components of tobacco treatment that are recommended in the guidelines (Public Health Service's Guideline).[47] In addition, researchers noted that the areas that received the least coverage were those that could maximize the interactive capabilities of the Internet the most, such as providing tailored advice and arranging follow-up contact.

Table 1
Number of HBC-I Screening Criteria Met*

Number of Criteria Met	Websites Meeting Criteria No. (%)
0	113 (41.4)
1	57 (20.9)
2	34 (12.5)
3	27 (9.9)
4	20 (7.3)
5	22 (8.1)

* Source: Evers et al.[47]

The HBC-I Screener was used to evaluate 273 valid websites representing seven targeted behaviors: alcohol use, diet, exercise, smoking, asthma management, depression management, and diabetes management.[49,50] Websites were given an overall score ranging from 0 to 5 depending on how many of the criteria were met (Table 1). Overall scores were normally distributed with an average of 1.45 (SD = 1.64) criteria met. Only 8.1% (n = 22) of the websites met all five criteria of the HBC-I Screener, and only 7.3% (n = 20) met four criteria. Of those sites meeting four or more of the criteria (n = 42), the behavior most represented was smoking (n = 12; 28.6%) followed by diet (n = 11; 26.2%).[48]

Table 2 presents the number of websites meeting each of the "5 A's" criterion by behavior. The area in which the most websites met criteria was *Assess* with 51.6% (n = 141), and the fewest met *Anticipatory Guidance* with 11.4% (n = 31).

A one-way analysis of variance was conducted to examine the differences in number of criteria met by the behaviors and showed significant results ($F_{7, 272} = 5.89$, $p < .001$, $eta^2 = .14$). Websites that focused on diet, exercise, and smoking met significantly more of the criteria than did websites focusing on other behaviors, and websites in the areas of exercise and smoking received significantly higher overall ratings than did websites in asthma management.[50]

An expanded version of the HBC-I Screener was developed to provide more in-depth review criteria concerning the "5 A's" criteria of the HBC-I.[49] Twenty-one behavior-change criteria were developed based on the five HBC-I screening criteria, and two questions were added to specifically address five major health-behavior–change theories and variables.[45] The HBC-I Expanded was used to evaluate sites that met a minimum of four of the five HBC-I Screener criteria as described above. Evers et al.[49] outlined the results of the reviews. The following highlights are primarily from the "5A's" criteria[48]:

- *Advise*: A total of 54% of the sites (n = 20) clearly identified their intended audience, 84% (n = 31) explicitly stated their goals, and 14% (n = 5) implicitly stated their goals.[48]
- *Assist*: A total of 97% of the sites (n = 36) provided feedback strategies to assist users in achieving health behavior change. The majority of the sites targeted feedback based on the assessments by segmenting the population into specific categories rather than providing individualized feedback. With segmented tailoring, participants were grouped according to a specific variable, and feedback was the same for everyone in that group. However, there is a growing consensus that individually tailored health communication represents one of the most promising modalities for health behavior change.[48,51]
- *Arrange*: In terms of arranging follow-up, 11% of the sites (n = 4) specified when the user should come back to the program, and 22% (n = 8) used daily email reminders to keep users in touch with the program. Other suggestions ranged from coming back to the site to

Table 2
HBC-I Screening Criteria Met by Behavior*

Behavior	Assess No. (%)	Advise No. (%)	Assist No. (%)	Anticipatory Guidance No. (%)	Arrange Follow-up No. (%)
Asthma	11 (33)	10 (30)	3 (9)	2 (6)	5 (15)
Alcohol	10 (37)	3 (11)	1 (4)		
Diet	33 (67)	25 (51)	18 (37)	6 (12)	14 (29)
Exercise	30 (73)	19 (46)	15 (37)	7 (17)	14 (34)
Depression	19 (46)	9 (22)	3 (7)	1 (2)	1 (2)
Diabetes	21 (51)	18 (44)	7 (17)	2 (5)	9 (22)
Smoking	16 (44)	24 (67)	14 (39)	13 (36)	10 (28)
Total websites meeting criteria	141 (51.6)	108 (39.6)	62 (22.7)	31 (11.4)	54 (19.8)

* Source: Evers et al.[47]

reassess behavior after a period of time to participating on a day-to-day basis.[48]

The HBC-I criteria were developed to meet the specific needs of health promotion and behavior change on the Internet. The five basic criteria of the HBC-I (*Advise*, *Assist*, *Assess*, *Anticipatory Guidance*, and *Arrange Follow-up*) do not ensure efficacy for behavior change; rather, they outline the minimum criteria for a program to have the potential for providing behavior change. Systematic empirical evaluations of program efficacy would be needed to ultimately demonstrate efficacy. It was discouraging to learn that Evers et al.[49] found that none of the evaluated sites included statements about how the program was evaluated for effectiveness.

The STS-C,[47] STS-R,[48] and HBC-I[49] can provide templates for developers of programs, consumers looking for quality sites, and health professionals seeking to recommend the best sites for health promotion. As health promotion programs on the Internet mature from providing health information to meeting the requirements necessary to produce and maintain changes, and as program developers take advantage of the interactive nature of the Internet, these types of screening tools will be essential. Those criteria can instill developers and consumers with confidence that particular programs are at least providing components that meet the minimum conditions for effective behavior change.

Population Use of eHealth Promotion

To advance the science and practice of health promotion on the Internet, a systematic program of research to examine the population impact of such programs is needed. With impact described as a combination of both the effectiveness of a program and the level of participation in the program, such research needs to include not only the examination of the quality and effectiveness of programs that are available to the general public, but also descriptive and predictive knowledge about the population participation in such programs. Developers and researchers need to move beyond a narrow focus on early adopters and produce a population perspective on recruitment and retention of participants in programs.

To examine the issues of recruitment and retention in eHealth programs, cross-sectional and longitudinal data on a representative population of Internet users was collected in 2002 on readiness to use the Internet for health behavior change, as well as on the barriers to use.[48,52] Assessments were administered both proactively and reactively with invitations to participate in the study.[53] Of the 413 participants who completed the survey, only 375 were eligible to participate in the full assessment (eligibility requirements included use of the Internet and specific health risk behaviors). The national sample was similar in demographics to other national samples of Internet users conducted during the same time period; however, the current sample was significantly more highly educated and included more women.[53] Although the majority of respondents had used the Internet to get health information (80.5%), only 24.7% had used programs on the Internet for health behavior, health promotion, or disease management.[53] In terms of recruitment issues, the majority of respondents (62%) had no intention of starting to use health-behavior–change programs on the Internet in the foreseeable future. Of those who did report using programs, 40% reported using programs that were not using four of five of the HBC-I screening criteria.[53] A follow-up survey was completed 1 year later by 287 participants (77% retention). Of those individuals who had been using programs at the first survey administration, most were no longer using them and 61% had no intention of starting again.[53]

Conclusion

Through the use of the measures identified in this article, researchers, program developers, and providers can assess their population's readiness to use such programs and to assess any major concerns or barriers that their clients believe exist. However, the general results of the survey described above show a pessimistic view of the current potential for the adoption of the Internet for health promotion programs and for the retention of current users. The cons of using the Internet for health behavior change showed no significant decrease as individuals adopted Internet use,[53] indicating that even once individuals start using these programs, the drawbacks of using them are still high.

The next generation of eHealth promotion research needs to accept this challenge rather than simply examine the efficacy of Internet-based programs with select samples that represent relatively small percentages of at-risk populations. Until the field solves the overarching problem of helping significant percentages of a population progress toward using eHealth promotion programs, they will not be able to realize their potential to be the lowest cost modality for delivering tailored communications that can have the highest potential impacts on health promotion, disease prevention, and disease management.

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Selected Abstracts

The Zeitgeist of Online Health Search.

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BACKGROUND: Health care queries rank among the most frequent topics of information-seeking activity initiated by users of commercial search engines. The quality of information located through existing search engine technology has received little attention, especially when considering the widely varied knowledge levels of internet users. OBJECTIVE: This study sought to create a bench-