Published in final edited form as:

Marriage Fam Rev. 2009 ; 45(6-8): 629–653. doi:10.1080/01494920903224210.

Relationship-Relevant and Family-Friendly eHealth: Innovations in Interactive Health Communication Systems

LINDA J. ROBERTS and

Department of Human Development and Family Studies and Center for Health Enhancement Systems Studies, University of Wisconsin-Madison, Madison, Wisconsin, USA

SANDRA JAPUNTICH

Department of Psychology and Center for Tobacco Research and Intervention, University of Wisconsin-Madison, Madison, Wisconsin, USA

Abstract

As the reach of the Internet grows, eHealth is fast becoming a major adjunct to traditional delivery of health information and support worldwide. Existing Interactive health communication systems, however, typically target individual users, focus on individual rather than on relational health, and neglect the relational and familial context of individual health issues. Reviewing developments primarily in the United States, this article applies a “marriage and family lens” to examine web-based technologies for health and well-being and suggests innovations to make eHealth both relationship relevant and family friendly. Although recent innovations offer great promise for supporting the relational “fabric” of family life, specific cautions and the need for research on effectiveness are underscored.

Keywords

eHealth; family relationships; health; health communication; well-being

INTRODUCTION

The increasingly ubiquitous presence of digital information technology in everyday life is leading to profound societal transformations worldwide. As one observer put it, the Internet is “changing almost every aspect of our lives—private, social, cultural, economic and political” in “profound and unprecedented” ways (Manasian, 2003, p. 4). Indeed, Manuel Castells (1996) likened the impact of the Internet on society to that of the alphabet!

Families and other close relationships are in no way immune to these transformative effects. More families now have an Internet subscription than a newspaper subscription (Annenberg Public Policy Center, 2000, cited in Meszaros, 2004), and three quarters of all Americans have at least some access to the Internet (Pew Foundation, 2006). In fact, the web-linked computer adorning a table in the family room may be the “family hearth” for 21st century families—like the family hearth of the 19th century, it represents a centralized hub for family communication, problem solving, and leisure activity.

Whether the new wired family hearth serves an integrative and supportive function for family life is highly dependent on the ways in which the technology is used. Intensive Internet usage may isolate family members from one another, creating what has been called a “lonely crowd” in cyberspace (Nie, 2001; Nie & Erbring, 2000). Conversely, it may increase connection and communication between family members, helping to strengthen relationships, particularly long-distance family relationships (Boase, Horrigan, Wellman, & Raine, 2006; Wellman, Quan Haase, Witte, & Hampton, 2001). In addition to styles and patterns of use, the dizzying array of online applications and services family members use directly influences the way the Internet impacts family life. Family members may use the Internet to help with homework, play music and videos, develop family genealogies, learn new skills, get health information, create family scrapbooks, eulogize a loved one, “chat” with a relative on the other side of the world, gamble, watch pornography, shop, and much, much more. In this article we focus on the use of an increasingly popular type of Internet service: interactive health communication (IHC), or “eHealth.” Simply put, eHealth is the use of emerging information and communication technology, especially the Internet, to improve or enable health and health care (Eng, 2001). It is our contention that new innovations in eHealth offer great promise for supporting the health and well-being of individual users as well as the relational “fabric” of family life.

In the United States numerous government and foundation reports (e.g., Institute of Medicine, 2001; Science Panel on Interactive Communication and Health [SPICH], 1999) have excitedly proclaimed the real and potential benefits of web-delivered health information and support. For example, the Office for Disease Prevention and Health Promotion of the U.S. Department of Health and Human Services convened a special panel that produced a seminal report entitled, *Wired for Health and Well-Being: The Emergence of Interactive Health Communication* (SPICH, 1999). Although calling for caution, the panel was optimistic about the benefits of IHC, drawing the following conclusion:

The Panel believes that IHC has the potential to contribute substantially to the health of the public. Individual health status can be enhanced through the use of IHC for health promotion and disease prevention. By reaching, informing, and motivating people in innovative ways, these technologies can augment public health efforts and minimize the total burden of illness and its economic and social costs. By providing peer and emotional support, IHC has the potential to alleviate the adverse social and emotional consequences of illness, and, perhaps, improve functional status (SPICH, 1999, p. 96).

Since this early report there has been a dramatic increase in scholarly and research attention to the opportunities and challenges of Internet health promotion (Ahern, 2007). Yet very few observers have gone beyond an individual or patient-centered vantage point to a relational or family perspective on eHealth. Our goal here is to explicitly apply a “marriage and family lens” to examine recent innovations in web-based technologies for health and well-being. We argue that eHealth can be relationship relevant and family friendly, and we provide rationale and recommendations for developments in this direction.

We begin by describing the operation and functions of web-based interactive health communication systems and review research supporting their effectiveness. We then provide evidence for the importance of the relational and familial context in supporting health and well-being and discuss the benefits of Internet delivery for reaching couples and families and supporting individual, marital, and family health. Based on our review and discussion, we conclude that eHealth has great promise, but we also identify a host of cautions and caveats and underscore the need for research on effectiveness and clinical significance. In addition to relying on theory and published research, we incorporate our experiences with the development and evaluation of a well-established interactive health communication

system (IHCS), the Comprehensive Health Enhancement Support System (CHESS; Gustafson et al., 2002).

INTERACTIVE HEALTH COMMUNICATION SYSTEMS

The Internet has become a prolific source of health information and may arguably be the first line of defense in the diagnosis, treatment, and prevention of disease as well as psychological and emotional suffering (Hesse et al., 2005; SPICH, 1999). A national survey conducted in 2003 indicated that 64% of online users searched for health-related information at least once in the course of the previous 12 months (Hesse et al., 2005). Moreover, for a full 50% of Americans, the Internet was the first place they reported going for information related to their own or another person's health. Considering lifetime Internet use, the vast majority of users (80%)—or 113 million people—report getting health information online, making health information seeking one of the most popular activities on the Internet (Fox, 2006). The last decade has witnessed nothing less than “revolutionary growth” in the availability of health-related information online (Ahern, 2007), and there is little question that the Internet is fast becoming a major adjunct to traditional delivery of health information and support.

Although information delivery remains a primary function of eHealth, the development of web-delivered IHCSs signals a move to more complex supportive experiences for Internet users, including personalized assessments, tracking or monitoring of behaviors, tailored feedback and advice, and skills training—functions common in interventions based on face-to-face human communication. In a survey of Internet users in 2005 (Horrigan & Rainie, 2006), 45% reported that the Internet helped them make a big decision or negotiate their way through a major issue or turning point in their life (e.g., their own or someone else's illness, a career shift, etc.). As the Internet has the potential to deliver “highly specialized psychological interventions otherwise not sought or obtainable” (Ritterband et al., 2003, p. 527), the distinction between education and behavior counseling is blurred (Noell & Glasgow, 1999). In this new eHealth landscape, users can find tools for everything from simple information searches to medical decision making, behavior change programs (e.g., smoking cessation), and coping support (e.g., dealing with the loss of a family member).

CHESS (Gustafson et al., 2002) is an example of an evidence-based approach to eHealth intervention. Developed by an interdisciplinary team of scientists over the past two decades and disseminated to thousands of users in controlled clinical trials, CHESS may be the most widely researched IHCS. Although CHESS has been developed to target users facing several different types of health issues (e.g., smoking, asthma, AIDS, heart disease), in our descriptions here we focus on CHESS for cancer. In developing the content and services in CHESS, a combination of patient needs assessments, focus groups with patients and family members, and clinician expertise help identify needs, useful coping supports, and relevant medical information to provide to online users. The Internet delivery of CHESS is user driven, allowing branching with flexibility and variety; thus different users can get very different information and services out of the system, and users can avoid content and services that do not fit their needs. Randomized evaluation studies suggest that CHESS improves coping, health self-efficacy, and quality of life for both younger and older cancer patients, across socioeconomic levels, and for both African American and White women (e.g., Gustafson et al., 1999, 2001, 2005).

In their 1999 report, SPICH suggested six specific functions of IHC, all of which have remained mainstays of eHealth today. In what follows we describe these functions, illustrating their operation with examples from CHESS.

Primary Functions of IHCS

Relay information—CHESS provides information in numerous ways, including the delivery of research and popular news articles on cancer, responses to frequently asked questions, and personal stories of other cancer patients. In addition, the system links the user to outside sources of information, including other health-related websites and the CHESS “ask an expert” service in which users e-mail questions to a cancer expert. Information is accessed in a variety of ways, providing an experience of user control; users can browse for information, search for specific information, receive recommendations from the system based on their responses to a check-in survey, or pose questions to the expert or to other CHESS users.

Enable informed decision making—CHESS helps the user make important decisions about his or her health, such as choosing a treatment plan or making healthy life-style choices. CHESS aids in decision making regarding cancer treatment by offering clear, concise, medically approved information on cancer treatments and stories about the processes that others went through in coming to their own decision. In addition, CHESS contains modules that help users both learn decision-making skills (review options, clarify values, evaluate consequences of decisions) and plan for action (identify goals, resources, and obstacles). Finally, CHESS provides a journaling service where participants can use expressive writing to think through their decisions.

Promote healthy behaviors—The SPICH panel (1999) noted that online interventions could be developed to be entirely consistent with contemporary health behavior change theories—CHESS not only provides information on healthy behaviors but is designed to support behavior change. CHESS provides services that interactively coach or teach cognitive and behavioral skills that promote and maintain health. Current interactive coaching modules include two designed to help users deal with negative affect (one uses cognitive behavioral therapy techniques and the other uses mindfulness meditation techniques) and another designed to help users manage sexual problems secondary to the cancer or cancer treatment.

Promote peer information exchange and emotional support—CHESS promotes peer communication by recruiting individuals with the same health issue and providing discussion boards where users can discuss common concerns. Peer-led discussion groups provide a forum for users to spontaneously share their concerns as well as to both give and receive emotional and instrumental peer support.

Promote self-care—An explicit goal of IHCSs is to remove, where possible, a reliance on expensive professional services. Although CHESS is not a replacement for physician contact, CHESS provides adjunctive services and gives the user expert suggestions for managing cancer. CHESS also helps the user manage secondary conditions that may be exacerbated by cancer such as depression or anxiety. By providing contact information for community resources, CHESS empowers users to find additional supports that may be needed.

Manage and optimize demand for health services—IHCSs can direct users to the appropriate services when they need them and, conversely, help users who do not need professional services manage their concerns outside of a health professional’s office. The information and self-care services offered in CHESS can substitute for more costly one-on-one professional consultation. At the same time, the referral and “ask an expert” functions can help users who need additional support find it.

Do IHCSs Help?—Research on Internet interventions has increased dramatically in the past few years (Ahern, 2007; Curry, 2007), and a number of online interventions now have a positive evidence base (for reviews, see Rittenband et al., 2003; Wantland, Portillo, Holzemer, Slaughter, & McGhee, 2004). In addition to the positive results from randomized clinical trials of CHES that we described earlier, a host of other IHCSs have demonstrated effectiveness across a diverse array of health issues, including weight loss (e.g., Tate, Jackvony, & Wing, 2007), physical activity (Vandelanotte, Spathonis, Eakin, & Owen, 2007), smoking cessation (Cobb, Graham, Bock, Papandonatos, & Abrams, 2005; Strecher, Shiffman, & West, 2005), college drinking (Walters, Miller, & Chiauzzi, 2005), depression (Christensen, Griffiths, & Jorm, 2004), anxiety and panic (Andersson, Bergstrom, Carlbring, & Lindefors, 2005), tinnitus (Andersson, Stromgren, Strom, & Lyttkens, 2002), and diabetes management (McKay, Glasgow, Feil, Boles, & Barrera, 2002). Additionally, a meta-analysis of web-based interventions found IHCSs to be generally efficacious at increasing knowledge and motivating behavior change (Wantland et al., 2004).

As empirical evidence for eHealth effectiveness mounts, additional growth and development in the scope and functions of IHCSs is certain. However, up to this point IHCSs have adopted approaches similar to traditional delivery of psychosocial support services—they tend to target individual users and focus on individual rather than on relational health, typically ignoring the relational and familial context of individual health issues. As we argue in the next section, there is good reason to believe that interventions that expand from a person- or patient-centered approach to a social- or relationship-focused approach will meet with even higher success rates.

RELATIONSHIP-RELEVANT AND FAMILY-FRIENDLY eHEALTH

Social and Familial Context of Health and Well-Being

Since Durkheim's seminal study of the association between low levels of social integration and the likelihood of suicide, evidence for the important role that social and family relationships play in physical and mental health has been steadily growing (e.g., Berkman, Glass, Brissette, & Seeman, 2000; Berkman & Syme, 1979; Cohen, 1988; Cohen, Doyle, Turner, Alper, & Skoner, 2003; Umberson & Landis, 1988). Evidence is accruing for the effects of social support on a diverse array of health outcomes, but perhaps the most convincing evidence comes from epidemiological studies that link a lack of social support or poor levels of social integration to higher rates of mortality (e.g., Berkman et al., 2000). Strong social and personal relationships can be a matter of life and death and certainly impact quality of life.

Several different mechanisms are posited to explain the salutary role of relationships for physical and emotional health. Social support may have direct effects on the physiology of stress and immune functioning (Cohen, 1988, 2004; Jackson, 2006). Social support is also thought to improve health indirectly through the promotion of positive life-style and health behaviors (DiMatteo, 2004). For individuals with health issues, the instrumental support and care that family and close friends provide to one another may be an essential factor in the recovery from illness. For example, a lack of social support has been found to be a predictor of patient failure for self-management of chronic disease (Jackson, 2006; Jerant, von Frienderichs-Fitzwater, & Moore, 2005). Research suggests that help with adherence to medical regimens may be a critical way that social support improves health (Bisogni, Jastran, Shen, & Devine, 2005; DiMatteo, 2004; Dunbar-Jacob & Schlenk, 2001). Regardless of the specific mechanism of effect, what is indisputable is that the social and familial context matters for health and well-being.

Taking the social and familial context seriously requires modifications in the content and delivery of prevention and intervention programming. Reaching individuals in the context of their personal-social network is exceptionally difficult in face-to-face encounters. Traditional barriers to treatment such as cost, inconvenience, and social stigma are magnified when more than one person is involved. More fundamentally, notions of health and well-being institutionalized in medical, health, and psychological service delivery systems are individualistic at core. eHealth has less rigid boundaries, its reach can be both wider and deeper, and it is well-suited to enabling a transformation to an approach more relationship-centered at core. We suggest two interrelated innovations in the content and delivery of IHCSs to support this transformation: (1) an explicit focus on relationship health to complement existing emphases on physical and emotional/psychological health and (2) an expansion of the targeted user from an individual to a dyad, family, or personal network. We first discuss potential directions for these two innovations in the coming years and then review the promises and potentials as well as the cautions and caveats for future efforts to design relationship-relevant and family-friendly eHealth systems.

eHealth to Support Relationship Health

Close, intimate bonds are an essential and fundamental feature of human existence (Reis, Collins, & Bersheid, 2000). For most people it is family members who provide the strongest threads in their social fabric, and for most adults a relationship with a spouse or partner is pivotal. Although morbidity and mortality are found to be lower for married individuals than for those who are single, the simple presence of a spouse or partner is not enough to ensure health benefits; it is increasingly clear that relationship *quality* matters (Kiecolt-Glaser et al., 2005). Unfortunately, couple bonds are both volatile and fragile. Not all couple relationships have salutary health effects; in fact, couple relationships are a common context for stress, emotional pain, and violence. The health of marriage and couple relationships cannot be taken for granted. Extramarital affairs occur in as many as one third of marriages (Laumann, Gagnon, Michael, & Michaels, 1994), over 50% of marital relationships dissolve, and it is estimated that at least half of the marriages that remain intact experience periods of significant strain and unhappiness. When committed couple relationships are dissolved, both children and parents experience a range of negative consequences, from a decrease in economic status, to absent or limited contact with one parent, to family conflict, stress, and ultimately compromises in physical and emotional functioning (Amato & Keith, 1991). Divorce is not the only path to negative consequences for families. Couple relationships characterized by negativity and conflict have been demonstrated to result in unhealthy physiological reactivity for the partners (Kiecolt-Glaser et al., 2005) as well as for children who experience their parents' arguments (Cummings & Davies, 1994). Ignoring the health of couple relationships represents a significant cost to communities and society.

Researchers are increasingly identifying specific communication and interaction processes that promote relationship quality and success. These research findings, in turn, are being used to inform efforts to provide prevention and intervention programs to help couples achieve a happy and stable conjugal bond. Using results from basic research on the difference between distressed and nondistressed couples, relatively simple educational and skills-building activities have been developed and have been shown to have a positive impact on couple functioning (e.g., Baucom, Halweg, Atkins, Engl, & Thurmaier, 2006; Hahlweg, Markman, Thurmaier, Engl, & Eckert, 1998; Halford, Sanders, & Behrens, 2001; for review see Halford, Markman, Kline, & Stanley, 2003). For example, the Prevention and Relationship Enhancement Program (PREP; Markman, Floyd, Stanley, & Storaasli, 1988) is based on strong evidence from the observational research tradition and has been evaluated with long-term follow-up (e.g., Markman et al., 1988; Markman, Renick, Floyd, Stanley, & Clements, 1993). Three years after the intervention, PREP couples maintained higher levels

of relationship satisfaction and sexual satisfaction and lower problem intensity than matched control couples (Markman et al., 1988) and showed greater communication skill, positive affect, and overall positive communication than control couples (Markman et al., 1993).

Despite their promise, empirically based educational and skills-building programs to strengthen relationships have not been widely disseminated. In the United States relatively few couples participate in any form of relationship education and even fewer seek therapy or other professional help for relationship issues. Establishing effective delivery strategies for relationship enhancement programs represents a critical issue for the field. To ensure the greatest impact of relationship programming, ideally, all couples would have access to the intervention and it would be delivered to them, together, in the privacy of their own home “on demand” (or whenever they choose) and at no cost. Although delivering a program in this “ideal” way at first may sound highly implausible, Internet delivery presents such an option.

Recent advances in CHESS include the incorporation of a research-based module designed to enhance relationship functioning. The principles used in CHESS Healthy Relating are derived from basic research on relationship functioning and are similar to the intervention techniques advanced in empirically validated couple therapy and relationship enhancement programs such as PREP (Markman et al., 1993). Although Healthy Relating was originally conceived of as an intervention for couples, many patients recruited for our clinical trials do not have spouses or partners. Yet our needs assessment indicated a strong interest in information and support related to interpersonal communication across a range of relationship types. Therefore our development plans were modified, and although our intervention is based on principles derived from couples’ research, Healthy Relating was designed as a service to be used to enhance relational functioning in any type of dyadic relationship (e.g., parent-child, friends).

Although the number of websites offering eHealth for relationships is growing rapidly, relatively few have a research base for the content they are delivering; moreover, we were not able to find any controlled outcome studies evaluating the success of web-delivered relationship support at this time. Nonetheless, there appears to be a growing interest in relationship education delivered via the Internet and the exciting new potential to bring a neglected but important focus on relationship health to the foreground.

eHealth Expanding to the Dyad, Family, or Personal Network

Since their inception, IHCSs have targeted individual users. However, because Internet-connected computers are increasingly becoming fixtures in the home, reaching individuals in the context of their home and family life is now feasible. In a recent clinical trial CHESS offered additional secure logins to anyone the cancer patient wanted to give access to CHESS resources. In this way both patient and members of his or her support network could take active part in the online guidance and support features of CHESS. Other CHESS users have reported sitting down at the computer with a partner and accessing information and resources together. Internet delivery opens the door to involving more than a solitary patient or a single family member: A personal network of friends and family can be invited to collaborate for the promotion of health and well-being. Partners, families, or an entire personal network can be the target of an eHealth intervention and, in the process, part of the solution.

Using traditional face-to-face formats, family-involved treatment has received mixed support in terms of improving health outcomes. However, a recent meta-analysis found support for reductions in both patient and caregiver depression and anxiety and increases in relationship satisfaction as a result of involving a family member in psychosocial

interventions for chronic illness (Martire, Lutzig, Schulz, Miller, & Helgeson, 2004). Changes in one spouse's health have been shown to be positively related to the other spouse initiating more health-promoting behaviors (e.g., quitting smoking, changing diet or exercise patterns; Campbell, 2002). Not unsurprisingly, it may be more difficult to quit smoking or diet if behaviors are "family habits." Behavior therapists have cogently argued that when change is initiated by other individuals in a client's interpersonal network at the same time that the client makes changes, outcomes are more likely to be maintained (Bandura, 1977). Spouse or family involvement in psychosocial interventions has been found to promote positive outcomes for a variety of problems, including depression (e.g., Jacobson, Dobson, Fruzzetti, Schmallinger, & Salusky, 1991), obesity (Brownell, Heckerman, Westlake, Hayes, & Monti, 1978), diabetes control (Delamater et al., 1990), and alcoholism (McCready, 1989; O'Farrell, Cutter, & Floyd, 1985). On the other hand, spousal pressure to improve health has not been consistently shown to have positive impacts on health (Helgeson, Novak, Lepore, & Eton, 2004).

Although overall evidence is mixed for the utility of family involvement, Martire et al. (2004) pointed out that most interventions that involve family members do not explicitly target relationship issues in the intervention. They found that family-involved interventions that address and are successful in improving the quality of family relationships have a greater impact on health. More importantly, face-to-face family-involved interventions are plagued with a host of problems (e.g., coordinating multiple family members' schedules in order to meet) that hinder the feasibility, acceptance, and execution of these approaches. Internet delivery, however, overcomes many of these impediments and may represent a new avenue for effectively enlarging the target of interventions to the person in a social context.

Promises and Potential of the Internet for Relationship-Relevant and Family-Friendly Health Programming

Although the Internet serves as a vast clearinghouse for information on physical, psychological, and social health, it is far more than a library of organized information—the Internet is fundamentally an interpersonal communication medium (Cassell, Jackson, & Cheuvront, 1998). A major impetus for the success and expansion of the Internet is at base social (Bargh & McKenna, 2004). It turns out that rather than looking for information, "many health information Web surfers may actually be searching for someone else" (Hesse, 2005, *italics added*). It has been argued that the Internet is having a profound transformative power in the globe precisely because "these new electronic technologies deal with the very essence of human society: communication between people" (Manasian, 2003, p. 4). Although the centrality of human cooperation and communication may not have been obvious to initial Internet users and investors, the social dimension of the Internet is now explicit in what is heralded as a new phase in Internet development, widely referred to as "Web 2.0." Web 2.0 services—including weblogs, wikis, and social networking software—facilitate sharing and collaboration; users not only download from the Internet but upload as well, creating greater interactivity than was characteristic of Web 1.0 applications. This second generation of Internet services does not reflect an update in technology but a change in the way the web platform is used by both software developers and end users (Web 2.0, 2007). The recent rise of user-controlled social networking websites (such as MySpace.com, Facebook.com, and Ning.com) allow users to design their own profiles; upload stories, photos, music, and videos; and invite and manage their own support network.

Although some of these Web 2.0 elements have been present in IHCSs (including CHES) for years, the increase in popularity and accessibility of these new services is sure to significantly transform eHealth. More relationship-relevant and family-friendly interventions can and should be front and center in this transformation. Harnessing the *social power* of the Internet promises to significantly deepen the ways the Internet can support

human health and well-being. In addition to the potential for directly addressing relationship health in Internet programming and reaching the person-in-social-context, IHCSs have a number of specific benefits, reviewed below, to suggest they will be on the forefront of future efforts to improve health and well-being.

Facilitating and enhancing communication

Although a great deal of attention is given to the ability of the Internet to facilitate the formation of new relationships (e.g., with others who share the same disease, with new potential dating partners, etc.; McKenna, Green, & Gleason, 2002; Parks & Floyd, 1995), less attention has been given to the potential for facilitation of communication within families and other close relationships. The Internet has the potential to link members of existing personal networks in a variety of ways. Social networking websites, blogs, and e-mail can help keep family and close friends updated on life events and can create a shared space to make virtual contact. Virtual contact may be less demanding than live contact, which requires that both parties be available at the same time. Everyday online communication can also now be media rich, incorporating new sights and sounds (pictures, videos). For example, there are now Internet sites that provide updates to a personal network on a person's health and provide a means to efficiently coordinate care. With the incorporation of communication skills training and other insights from relationship education programming, eHealth websites not only facilitate communication but can help enhance the quality and effectiveness of human communication.

User driven and interactive

A central feature of all eHealth interventions is the active user. The user decides which information or services he or she would like to receive and when. An active user is empowered to take greater control over his or her own health and well-being, increasing the sense of ownership and self-direction. In addition, through the use of chat rooms, discussion boards, personal web pages, blogs, social networking software, and e-mail the user can not only get information from a variety of sources but can share information with other users. Thus in IHCSs users become health communicators themselves (SPICH, 1999). In the Web 2.0 environment, users are additionally in control of the design, traffic, and content in their personal social networking web spaces. Ning.com, for example, provides free, easy-to-use tools to build personal websites, allowing users to design their own social site; upload stories in text, photos, music, and videos; and invite and manage their own support network. This empowers users to seek social support and social contact from those important to them in ways that they can control.

Tailoring to the needs of the user

Tailoring refers to a process in which a web program recommends specific information, exercises, or services or alters the delivery of web content to apply specifically to a characteristic of the user. Tailoring is based on information the website collects on the user and an algorithm that defines what content is recommended based on user characteristics. Knowledge of the user may be based on patterns of previous web activity or on self-reports. Research has shown that tailoring results in better health outcomes for the user (e.g., in smoking cessation; Strecher et al., 2005). Tailoring may reduce the user's burden of determining which information is relevant—it efficiently gets important information to the user while eliminating unimportant information (Hesse, 2005). This tailoring could be an important feature of websites focused on relationship enhancement. For example, partners can take quizzes or “check-ups” individually, and then the program can analyze the results and report discrepancies or problem areas to the partners. This may highlight important strengths or problem areas for the users, encourage communication in a specific area, or suggest personalized resources to help improve the relationship.

Privacy/anonymity

Although many steps are taken to ensure that health care is confidential and anonymous, visits to health care professionals are publically observable events. The Internet takes anonymity to the next level, allowing the patient to literally let no one know they are seeking help or getting information about a real or potential personal health issue. This allows individuals to seek help for problems that may be difficult for them to talk about with a doctor or other professional (e.g., a sexually transmitted disease, relationship distress). In addition, a user can repeat an Internet intervention as often as they like, without facing the embarrassment of disclosing a set-back or inadequacy (e.g., a relapse back to smoking or overeating, an inability to process the information the first time). Internet interventions can also be a good option for those who are averse to seeking any professional assistance due to the stigma of needing help. Seeking help for couple or family issues may be a particularly sensitive area for some couples, but home-based, online help circumvents the need to publicly acknowledge help-seeking.

Anytime/anywhere availability

The Internet is available 24 hours a day, every day of the year—this 24/7/365 availability makes Internet interventions extremely convenient. Further, these interventions can be available in the users' home, at work, or anywhere with Internet access. Office visits are unnecessary, and the difficulty of coordinating multiple schedules is eliminated. As U.S. Surgeon General David Satcher wrote in a foreword to the SPICH (1999) report, "New and emerging communication tools may help bring life-enhancing knowledge to people in ways they can use, when and where they need it." This anytime/anywhere availability is vital in addressing health issues where motivation to take appropriate remedial action may wax and wane over time (e.g., smoking cessation, weight loss). In many cases, waiting for an appointment with a health care professional or counselor may miss a valuable but ephemeral "teachable moment."

Anytime/anywhere availability also means that services can be provided in traditionally underserved areas, where supplemental health care services (such as support groups) may be nonexistent. The difficulty in reaching individuals when and where they need services is compounded when trying to coordinate care for couples or families, where one must coordinate the schedules, motivation levels, and geographical locations of multiple parties. With an Internet-based intervention the homebound, rural homemaker and mother of three who feels frustrated with repeated misunderstandings with her spouse can seek help on the Internet while her children are napping. An important benefit of eHealth is precisely its potential to reach segments of the population who are unlikely or unable to receive supportive services in traditional psycho-educational venues.

Cost savings

Once an Internet intervention is developed, the cost of delivering the intervention to additional people is negligible. Cost per user is quite low, and these cost savings are passed on to the consumer, overcoming an important barrier to treatment. eHealth can be offered free or at very low cost to the user. Further, if the Internet can provide help to patients with less severe health issues or direct them to appropriate services, this would help preserve provider time for more severe cases, reducing provider burden (Cline & Haynes, 2001; Eysenbach, 2001). For the underserved or for individuals whose insurance may not cover help with psychological or relationship problems, the free or low-cost services available on the Internet represent a new avenue to help.

Wide, and potentially worldwide, reach

The Internet is accessible globally to anyone with Internet access. This allows researchers and health care providers to quickly and widely disseminate efficacious interventions. State-of-the-art interventions, if developed as web-delivered tools, can be provided to any Internet user, not just those living in an area with the specific program. This has the potential to reduce health disparities by giving everyone the same chance to receive efficacious interventions. Importantly, family and relationship-level interventions that previously have been available only to a select and often privileged few can be widely disseminated.

In sum, eHealth interventions offer several unique benefits not provided in face-to-face care settings, which make them an appealing adjuvant to traditional health care and a potential catalyst for more relationship-relevant and family-friendly programming. eHealth interventions certainly can benefit the user, but they may also benefit health care providers and the user's family members and personal network. With eHealth interventions we can both personalize interventions to the needs of the user; reach a multitude of users (including the underserved, the resistant, and those with other barriers to access); expand our reach from user to dyad, family, or personal network; and accomplish all of this at low cost.

Cautions and Caveats for eHealth

Although the Internet provides a host of potential benefits to users, there are some potential drawbacks of eHealth interventions in general and for relationship-focused interventions specifically. We highlight cautions identified by the SPICH report (1999), updating as necessary to reflect the issues eHealth faces in the coming years and identifying particular concerns specific to relationship and family-friendly eHealth.

Missing needed professional treatment

As noted in the SPICH (1999) report, it is possible that the ready availability of eHealth interventions may delay or block individuals from receiving formal treatment when needed. This can also be the case in relationship-focused eHealth. Whereas web-delivered relationship education can help enhance relationships by improving communication, reducing conflict, and increasing positive experiences, these interventions are not a replacement for professional help and are not designed to address serious relationship problems (e.g., physical or emotional abuse, decision making about divorce or separation, etc.). Not getting appropriate professional help when needed may exacerbate already serious relationship problems. There is no way to ensure that this problem does not occur, but eHealth interventions can recommend continued close contact with any preexisting health care professional or counselor and be explicit about which symptoms/behaviors would be best handled by a treatment professional rather than the online support. It is as important to communicate to users what an online intervention *cannot* do as it is to be clear what it can do.

Misunderstanding recommendations

Unlike face-to-face interventions, eHealth interventions are not easily able to verify that the user has understood directions and implemented any recommendations in the manner suggested. In social skills training, poor implementation of the skills may nullify any potential gains from the skills training. For example, an online communication enhancement exercise may teach the user the importance of using "I statements" rather than "you statements" to express feelings. However, it can be a common mistake to use I statements to blame, shame, or insult others (e.g., "*I feel* that you should come home on time" as opposed to an appropriate I statement such as "When you come home late, *I feel* unimportant").

Although online training can teach users about the difference, subtle nuances in the technique may be lost on users (or skipped) causing the intervention to be ineffective.

Information overload

Several problems are endemic to the process of obtaining information from the Internet generally and from eHealth interventions specifically. The first is the overwhelming amount of information available (Cline & Haynes, 2001; Eysenbach & Diepgen, 2001; Hesse, 2005). This can lead to “information overload” or “data smog” where individuals get so many recommendations about their health they do not know which to follow and so follow none (Cline & Haynes, 2001; Eysenbach & Diepgen, 2001; Hesse, 2005). In addition, eHealth websites are not always user friendly, often containing technical language and written at a high reading level (Cline & Haynes, 2001). Finally, web pages can stay on the Internet for years without being updated, producing out of date information (Cline & Haynes, 2001). Thus, when designing a website, user friendliness and continual updating should be primary objectives. CHESS uses headings, search options, and tailored recommendations intended to make it easier for users to find the information for which they are searching. Plain-language experts edit the CHESS content to make sure it is delivered at an eighth-grade reading level. As much as possible, technical terms are avoided. When technical language is necessary, a glossary is provided for users to look up unfamiliar terms. Finally, CHESS is updated frequently to reflect new breakthroughs in cancer treatment.

Privacy and confidentiality

Although individuals may believe they have privacy on the Internet, many Internet websites are not bound by the same provider-patient confidentiality laws that medical professionals are. Although professional websites work to safeguard information that is reported on the web, these safeguards are not used in all websites and could lead to the use of user’s information without their knowledge or permission (SPICH, 1999). This may particularly be an issue for new Web 2.0 innovations where users design personal networks and may have limited understanding of how to set security features and communicate those features to others in their network. For example, communication designed for a specific family member may be inadvertently delivered to the whole network. Programming needs to attend to safeguards to protect confidentiality.

Disparities in access

Although the Internet is a cost-effective way to increase the reach of interventions, there are still many barriers to access (Cline & Haynes, 2001; SPICH, 1999; Viswanath & Kreuter, 2007). First, whereas the Internet is available in many public places (e.g., malls, library), the convenience of eHealth is diminished if you cannot afford your own home computer with Internet connection. In addition, individuals who have difficulty reading or have low “health literacy” (the ability to understand complex health information) may not benefit from eHealth (Cline & Haynes, 2001; SPICH, 1999; Viswanath & Kreuter, 2007). Thus, although the promise of eHealth is that it can provide state-of-the-art health interventions to those who would not otherwise receive them, the “digital divide” may keep this goal from being realized. Future multimedia innovations involving sound, picture, and videos may help to address literacy issues. If reaching underserved populations is a goal of eHealth interventions, this population must be kept in mind in the early developmental stages. For example, CHESS was initially tested on computer-naïve women with a high degree of ethnic and socioeconomic diversity (Shaw et al., 2006). Importantly, results from clinical trials of CHESS have suggested that benefits of the intervention have been strongest in underserved populations, providing hope that eHealth may in fact help to lessen disparities in access to quality support for health and well-being in the future.

Incorrect information

eHealth websites do not always reflect information that is clinically validated (Cline & Haynes, 2001). This can be a particular problem in discussion boards, chat rooms, blogs, and other user-driven venues where nonexpert individuals are sharing personal opinions and advice. Users may believe this information to be of the same quality as information from expert websites or even from their health professionals. When developing an expert-based IHCS, it is critical to present clinically validated information and make this clear to the user.

Lack of established effectiveness

Although most professional websites maintained by reputable organizations attempt to include empirically supported information on their websites, the Internet interventions themselves have rarely been empirically tested to see if they are, in fact, able to help users (Cline & Haynes, 2001). As Atkinson and Gold (2002) pointed out, the early agenda for eHealth was driven largely by the for-profit sector, and it is important that researchers and educators step in and learn to evaluate and use this delivery strategy ethically and effectively. Thus far, research on the use of the Internet for relationship health has focused on cybercounseling, or actual communications with a counselor (either live or via e-mails and chat-rooms) (Jencius & Sager, 2001; Pollack, 2006; Stevens-Smith, 1997). However, none of these studies has examined the efficacy of such interventions in a clinical trial. Whereas live counseling provided via the Internet is certainly an important way to reach more clients, it is only the tip of the iceberg in terms of the possibilities for web-based relationship education. The Internet can, and does, provide psychoeducational websites that are not supervised by a counselor on such topics as communication skills, conflict resolution skills, and suggestions for cultivating positive relationships, but studies of effectiveness and efficacy are lacking.

Unfortunately, research on the impact of IHCSs has been difficult due to a number of design issues. First, it is difficult to identify an effective control group (Ahern, 2007). Some studies have given control participants printed materials, some have used waiting list control, and others have given the control group a less-advanced version of an Internet intervention. Thus one difficulty in evaluating online interventions is that it is difficult to compare the efficacy of interventions across studies due to differences in the comparison group. Second, with the Internet as ubiquitous as it has become, control group contamination from other websites is likely. Third, it is difficult to compare efficacy across studies because the outcome variables often differ. An online intervention for coping with cancer could measure a multitude of outcome variables such as quality of life, depression, discussions with doctors about treatment, symptom reduction, or even mortality. Fourth, the nature of the samples used can lead to difficulties comparing across studies (Ahern, 2007). Some Internet studies have chosen to take all interested volunteers and install computers and Internet in homes as needed. Other studies have required that users already have access to the Internet. The sample selected has implications for the population to which the research can be generalized. If a researcher chooses a sample of only experienced Internet users, the research should not be used to make decisions about whether Internet interventions could help the population of patients at large. However, if a researcher chooses to use a sample of novice Internet users, null findings could be due to difficulties in information gathering specific to computer literacy. Fifth, the Internet is constantly changing and evolving. As the Internet changes, this may change the efficacy of particular interventions. For example, we tested an Internet smoking cessation intervention at a time when dial-up Internet access was still used, and many participants simply found the access too slow to bother logging on. Those in the Internet intervention were not any more likely to quit smoking than those in the control group (Japuntich et al., 2006). However, those in the Internet group who accessed the website more frequently were more likely to quit smoking. Thus when the intervention was

used it was helpful, suggesting that it may be that the intervention was ineffective because the slow Internet connection was too much of a barrier to regular use. Rather than concluding that an online intervention such as this does not work, it will be important to retest this intervention using high-speed Internet access.

CONCLUSION

Technological revolutions are not genuinely revolutionary until they break out of the established mold of doing business. When the movie camera was first invented it was held stationary and pointed at the stage to record the unfolding play—the revolutionary innovation occurred only when the camera was moved and used to capture multiple perspectives on the stage and ultimately to escape the confines of the stage play altogether. eHealth faces a similar challenge. In a commentary for a special issue of the *Journal of Preventive Medicine* on critical issues for eHealth, Crounse (2007) warned, “Even though robust communication and collaboration solutions exist to speed scientific discovery and the delivery of care, all too often our methodology falls back on that which we know and have always done before.” Traditionally, health and medicine are person centered; the social web of relationships that the “patient” exists in is not easily accommodated in the clinic or counseling office. Web delivery, however, opens new possibilities for targeting and enhancing this web of personal and familial relationships. By facilitating the development and delivery of interactive, evidence-based interventions, family- and relationship-friendly eHealth has the potential to revolutionize societal support for individual—and relational—health and well-being.

Acknowledgments

We express our gratitude for support from the National Cancer Institute (P50 CA095817-01A1).

REFERENCES

- Ahern DK. Challenges and opportunities of eHealth research. *American Journal of Preventive Medicine*. 2007; 32:S75–S82. [PubMed: 17466822]
- Amato PR, Keith B. Parental divorce and the well-being of children: A meta-analysis. *Psychological Bulletin*. 1991; 110:26–46. [PubMed: 1832495]
- Andersson G, Bergstrom J, Carlbring P, Lindefors N. The use of the Internet in the treatment of anxiety disorders. *Current Opinion in Psychiatry*. 2005; 18:73–77. [PubMed: 16639187]
- Andersson G, Strömberg T, Ström T, Lyttkens L. Randomised controlled trial of Internet based cognitive behavior therapy for distress associated with tinnitus. *Psychosomatic Medicine*. 2002; 64:810–816. [PubMed: 12271112]
- Annenberg Public Policy Center. Public policy, family rules and children’s media use in the home (Report Series No. 35). Author; Philadelphia: 2000.
- Atkinson NL, Gold RS. The promise and challenge of eHealth interventions. *American Journal of Health Behavior*. 2002; 26:494–503. [PubMed: 12437024]
- Bandura, A. Social learning theory. General Learning Press; New York: 1977.
- Bargh JA, McKenna KYA. The Internet and social life. *Annual Review of Psychology*. 2004; 55:573–590.
- Baucom DH, Halweg K, Atkins DC, Engl J, Thurmaier F. Long-term prediction of marital quality following a relationship education program: Being positive in a constructive way. *Journal of Family Psychology*. 2006; 20:448–455. [PubMed: 16938003]
- Berkman LF. Social support, social networks, social cohesion and health. *Social Work in Health Care*. 2000; 31:3–14. [PubMed: 11081851]
- Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. *Social Science Medicine*. 2000; 51:843–857.

- Berkman LF, Syme L. Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology*. 1979; 109:186–204. [PubMed: 425958]
- Bisogni CA, Jastran M, Shen L, Devine CM. A biographical study of food choice capacity: Standards, circumstances, and food management skills. *Journal of Nutrition Education'Behavior*. 2005; 37:284–291.
- Boase, J.; Horrigan, JB.; Wellman, B.; Rainie, L. The strength of Internet ties. Pew Internet'American Life Project; Washington, DC: 2006.
- Brownell KD, Heckerman CL, Westlake RJ, Hayes SC, Monti PM. The effect of couples training and partner co-operativeness in the behavioral treatment of obesity. *Behavior Research'Therapy*. 1978; 16:323–333.
- Campbell, TL. Family Interventions for physical disorders; Manuscript prepared for the AAMFT conference on Marriage and Family Therapy Effectiveness; 2002;
- Cassell MM, Jackson C, Cheuvront B. Health communication on the Internet: An effective channel for health behavior change? *Journal of Health Communication*. 1998; 3:71–79. [PubMed: 10947375]
- Castells, M. The information age: Economy, society and culture. Vol. I: The rise of the network society. Blackwell; Malden, MA/Oxford: 1996.
- Christensen H, Griffiths KM, Jorm AF. Delivering interventions for depression by using the Internet: Randomised controlled trial. *British Journal of Medicine*. 2004; 328:265–269.
- Cline RJW, Haynes KM. Consumer health information seeking on the Internet: The state of the art. *Health Education Research*. 2001; 16:671–692. [PubMed: 11780707]
- Cobb N, Graham A, Bock B, Papandonatos G, Abrams D. Initial evaluation of a real-world Internet smoking cessation system. *Nicotine'Tobacco Research*. 2005; 7:207–216.
- Cohen S. Psychosocial models of the role of social support in the etiology of physical disease. *Health Psychology*. 1988; 7:269–297. [PubMed: 3289916]
- Cohen S. Social relationships and health: Berkman'Syme (1979). *Advances in Mind-Body Medicine*. 2001; 17:5–7. [PubMed: 11270065]
- Cohen S. Social relationships and health. *American Psychologist*. 2004; 59:676–684. [PubMed: 15554821]
- Cohen S, Doyle WJ, Turner R, Alper CM, Skoner DP. Sociability and susceptibility to the common cold. *Psychological Science*. 2003; 14:389–395. [PubMed: 12930466]
- Crounse B. The newspaper, the wristwatch, and the clinician. *American Journal of Preventive Medicine*. 2007; 32:S134–S134. [PubMed: 17466819]
- Cummings, EM.; Davies, PT. Children and marital conflict: The impact of family dispute and resolution. Guilford Press; New York: 1994.
- Curry SJ. eHealth research and healthcare delivery beyond intervention effectiveness. *American Journal of Preventive Medicine*. 2007; 32:S127–S130. [PubMed: 17466817]
- Delamater AM, Bubb J, Davis SG, Smith JA, Schmidt L, White NH, Santiago JV. Randomized prospective study of self-management training with newly diagnosed diabetic children. *Diabetes Care*. 1990; 13:492–498. [PubMed: 2351027]
- DiMatteo MR. Social support and patient adherence to medical treatment: A meta-analysis. *Health Psychology*. 2004; 22:207–218. [PubMed: 15008666]
- Dunbar-Jacob, J.; Schlenk, E. Patient adherence to treatment regimen. In: Baum, A.; Revenson, TA.; Singler, JE., editors. *Handbook of health psychology*. Erlbaum; Mahwah, NJ: 2001. p. 571-580.
- Eng, TR. The eHealth landscape: A terrain map of emerging information and communication technologies in health and health care. Robert Wood Johnson Foundation; 2001. Retrieved from www.rwjf.org
- Eysenbach G. What is eHealth? *Journal of Medical Internet Research*. 2001; 3:20.
- Eysenbach G, Diepgen TL. The role of e-health and consumer health informatics for evidence-based patient choice in the 21st century. *Clinics in Dermatology*. 2001; 19:11–17. [PubMed: 11369478]
- Fox, S. Online health search 2006. Pew Internet and American Life Project, 2005. 2006. Retrieved from www.pewinternet.org/PPF/r/190/report_display.asp

- Gustafson DH, Hawkins R, Boberg E, Pingree S, Serlin RE, Graziano F, et al. Impact of a patient-centered, computer-based health information/ support system. *American Journal of Preventive Medicine*. 1999; 16:1–9. [PubMed: 9894548]
- Gustafson DH, Hawkins RP, Boberg EW, McTavish F, Owens B, Wise M, et al. CHESS: 10 years of research and development in consumer health informatics for broad populations, including the underserved. *International Journal of Medical Informatics*. 2002; 65:169–177. [PubMed: 12414016]
- Gustafson DH, Hawkins RP, Pingree S, McTavish F, Arora N, Mendenhall J, Cella D, Serlin R, Apantaku F, Stewart J, Salner A. Effect of computer support on younger women with breast cancer. *Journal of General Internal Medicine*. 2001; 16:435–445. [PubMed: 11520380]
- Gustafson DH, McTavish FM, Stengle W, Ballard D, Hawkins R, Shaw BR, et al. Use and impact of eHealth system by low-income women with breast cancer. *Journal of Health Communication*. 2005a; 10(Suppl. 1):195–218. [PubMed: 16377608]
- Gustafson DH, McTavish FM, Stengle W, Ballard D, Jones E, Julesberg K, et al. Reducing the digital divide for low-income women with breast cancer: A feasibility study of a population-based intervention. *Journal of Health Communication*. 2005b; 10(Suppl. 1):173–193. [PubMed: 16377607]
- Hahlweg K, Markman HJ, Thurmaier F, Engl J, Eckert V. Prevention of marital distress: Results of a German prospective longitudinal study. *Journal of Family Psychology*. 1998; 12:543–556.
- Halford WK, Markman HJ, Kline GH, Stanley SM. Best practice in couple relationship education. *Journal of Marital and Family Therapy*. 2003; 29:385–406. [PubMed: 12870411]
- Halford WK, Sanders MR, Behrens BC. Can skills training prevent relationship problems in at-risk couples? Four-year effects of a behavioral relationship education program. *Journal of Family Psychology*. 2001; 15:750–768. [PubMed: 11770479]
- Helgeson VS, Novak SA, Lepore SJ, Eton DT. Spouse social control efforts: Relations to health behavior and well-being among men with prostate cancer. *Journal of Social/Personal Relationships*. 2004; 21:53–68.
- Hesse, BW. Harnessing the power of an intelligent health environment in cancer control. In: Bushko, RG., editor. *Studies in health technology and informatics* (volume title: *Future of Intelligent and Extelligent Health Environment*. Vol. 188. IOS Press; Amsterdam: 2005. p. 159-176.
- Hesse BW, Nelson DE, Kreps GL, Croyle RT, Arora NK, Rimer BK, et al. Trust and sources of health information: the impact of the Internet and its implications for health care providers: Findings from the first Health Information National Trends Survey. *Archives of Internal Medicine*. 2005; 165:2618–2624. [PubMed: 16344419]
- Horrigan J, Rainie L. The internet's growing role in life's major moments. Pew Internet and American Life Project. 2006 Retrieved from http://www.pewinternet.org/PPF/r/181/report_display.asp.
- Institute of Medicine. *Crossing the quality chasm: A new health system for the 21st century*. National Academy of Science Press; Washington, DC: 2001.
- Jackson T. Relationships between perceived close social support and health practices within community samples of American women and men. *Journal of Psychology*. 2006; 140:229–246. [PubMed: 16916076]
- Jencius M, Sager DE. The practice of marriage and family counseling in cyberspace. *Family Journal: Counseling and Therapy for Couples and Families*. 2001; 9:295–301.
- Jerant AF, von Frienderichs-Fitzwater MM, Moore M. Patients' perceived barriers to active self-management of chronic conditions. *Patient Education and Counseling*. 2005; 57:300–307. [PubMed: 15893212]
- Jacobson NS, Dobson KS, Fruzzetti A, Schmalting KB, Salusky S. Social-learning based marital therapy as a treatment for depression. *Journal of Consulting and Clinical Psychology*. 1991; 59:547–553. [PubMed: 1918559]
- Japuntich SJ, Zehner ME, Smith SS, Jorenby DE, Valdez JA, Fiore MC, et al. Smoking cessation via the internet: A randomized clinical trial of an internet intervention as adjuvant treatment in a smoking cessation intervention. *Nicotine/Tobacco Research*. 2006; 8(Suppl. 1):S59–S67.

- Kiecolt-Glaser JK, Loving TJ, Stowell JR, et al. Hostile marital interactions, proinflammatory cytokine production, and wound healing. *Archives of General Psychiatry*. 2005; 62:1377–1384. [PubMed: 16330726]
- Laumann, E.; Gagnon, J.; Michael, R.; Michaels, S. *The social organization of sexuality*. University of Chicago Press; Chicago: 1994.
- Manasian D. Digital dilemmas: A survey of the Internet society. *Economist*. 2003; 25:1–26.
- Markman HJ, Floyd FJ, Stanley SM, Storaasli RD. Prevention of marital distress: A longitudinal investigation. *Journal of Consulting and Clinical Psychology*. 1988; 56:210–217. [PubMed: 3372828]
- Markman HJ, Renick MJ, Floyd FJ, Stanley SM, Clements M. Preventing marital distress through communication and conflict management training: A 4-and 5-year follow-up. *Journal of Consulting and Clinical Psychology*. 1993; 61:70–77. [PubMed: 8450110]
- Martire LM, Lustig AP, Schulz R, Miller GE, Helgeson VS. Is it beneficial to involve a family member? A meta-analysis of psychosocial interventions for chronic illness. *Health Psychology*. 2004; 23:599–611. [PubMed: 15546228]
- Marziali E, Donahue P, Crossin G. Caring for others: Internet health care support intervention for family caregivers of persons with Alzheimer's, stroke, or Parkinson's disease. *Families in Society*. 2005; 86:375–383.
- McKay HG, Glasgow RE, Feil EG, Boles SM, Barrera M. Internet-based diabetes self-management and support: Initial outcomes from the Diabetes Network Project. *Rehabilitation Psychology*. 2002; 47:31–48.
- McKenna KYA, Green AS, Gleason MJ. Relationship formation on the Internet: What's the big attraction? *Journal of Social Issues*. 2002; 58:9–31.
- Meszaros PS. The wired family: Living digitally in the postinformation age. *American Behavioral Scientist*. 2004; 48:377–390.
- Moren-Cross, JL.; Lin, N.; Binstock, RH.; George, LK. Social networks and health. In *Handbook of aging and the social sciences*. 6th ed.. Elsevier; 2006. p. 111-126.
- Neuhauser L, Kreps GL. Rethinking communication in the E-health era. *Journal of Health Psychology*. 2003; 8:7–23. [PubMed: 22113897]
- Nie NH. Sociability, interpersonal relations, and the Internet: Reconciling conflicting findings. *American Behavioral Scientist*. 2001; 45:420–435.
- Nie, NH.; Erbring, L. *Internet and society: A preliminary report*. Stanford Institute of Quant. Study Soc; Stanford, CA: 2000.
- Noell J, Glasgow RE. Interactive technology applications for behavioral counseling: Issues and opportunities for health care settings. *American Journal of Preventive Medicine*. 1999; 17:269–274. [PubMed: 10606195]
- Parks MR, Floyd K. Making friends in cyberspace. *Journal of Communication*. 1995; 46:80–97.
- Pew Foundation. Internet penetration and impact, 2006. 2006. Retrieved from www.pewinternet.org
- Pollock SL. Internet counseling and its feasibility for marriage and family counseling. *Family Journal: Counseling and Therapy for Couples and Families*. 2006; 14:65–70.
- Reis HT, Collins WA, Berscheid E. The relationship context of human behavior and development. *Psychological Bulletin*. 2000; 126(6):844–872. [PubMed: 11107879]
- Ritterband LM, Gonder-Frederick LA, Cox DJ, Clifton AD, West RW, Borowitz SM. Internet interventions: In review, in use, and into the future. *Professional Psychology: Research and Practice*. 2003; 34:527–534.
- Science Panel on Interactive Communication and Health. (SPICH). *Wired for health and well-being: The emergence of interactive health communication*. U.S. Department of Health and Human Services, U.S. Government Printing Office; Washington, DC: 1999.
- Shaw B, Gustafson D, Hawkins R, McTavish F, McDowell H, Pingree S, Ballard D. How underserved breast cancer patients use and benefit from eHealth programs: Implications for closing the digital divide. *American Behavioral Scientist*. 2006; 49:823–834.
- Stevens-Smith P. Of cyberspace, managed care, and family counseling: Entering the 21st century. *Family Journal: Counseling and Therapy for Couples and Families*. 1997; 5:53–55.

- Strecher VJ, Shiffman S, West R. Randomized controlled trial of a web-based computer-tailored smoking cessation program as a supplement to nicotine patch therapy. *Addiction*. 2005; 100:682–688. [PubMed: 15847626]
- Stuber, ML.; Wedding, D.; Stuber, ML. *Behavior Medicine*. 4th ed.. Hogrefe'Huber Publishers; 2006. Families, relationships, and health; p. 23-29.
- Tate DF, Jackvony EH, Wing RR. Effects of Internet behavioral counseling on weight loss in adults at risk for type 2 diabetes: A randomized trail. *Journal of the American Medical Association*. 2003; 289:1833–1836. [PubMed: 12684363]
- Umberson D, Landis KR. Structure and processes of social support. *Annual Review of Sociology*. 1988; 14:293–318.
- Vandelanotte C, Spathonis KM, Eakin EG, Owen N. Website-delivered physical activity interventions: A review of the literature. *American Journal of Preventive Medicine*. 2007; 33:54–64. [PubMed: 17572313]
- Viswanath K, Kreuter MW. Health disparities, communication inequalities and eHealth. *American Journal of Preventive Medicine*. 2007; 32:s131–s133. [PubMed: 17466818]
- Wade SL, Carey J, Wolfe CR. The efficacy of an online cognitive-behavioral family intervention in improving child behavior and social competence following pediatric brain injury. *Rehabilitation Psychology*. 2006; 51:179–189.
- Wade SL, Wolfe C, Brown TM, Pestian JP. Putting the pieces together: Preliminary efficacy of a web-based family intervention for children with traumatic brain injury. *Journal of Pediatric Psychology*. 2005; 30:437–442. [PubMed: 15944171]
- Walters ST, Miller E, Chiauuzzi E. Wired for wellness: e-Interventions for addressing college drinking. *Journal of Substance Abuse Treatment*. 2005; 29:139–145. [PubMed: 16135342]
- Wantland DJ, Portillo CJ, Holzemer WL, Slaughter R, McGhee EM. The effectiveness of Web-based vs. non-Web-based interventions: A meta-analysis of behavioral change outcomes. *Journal of Medical Internet Research*. 2004; 6:e40. [PubMed: 15631964]
- Web 2.0. Wikipedia, The Free Encyclopedia. Aug 12, 2007 Retrieved August 12, 2007 from http://en.wikipedia.org/w/index.php?title=Web_2.0&oldid=198774953
- Wellman B, Quan Haase A, Witte J, Hampton K. Does the Internet increase, decrease, or supplement social capital? Social networks, participation, and community commitment. *American Behavioral Scientist*. 2001; 45:436–455.