

Health Communication on the Internet: An Effective Channel for Health Behavior Change?

MICHAEL M. CASSELL
CHRISTINE JACKSON
BRIAN CHEUVRONT

Department of Health Behavior and Health Education
University of North Carolina, Chapel Hill, North Carolina, USA

This article presents a theoretical rationale for using the Internet to conduct persuasive public health interventions. Through an examination of the conceptual bases of persuasion, it is posited that the World Wide Web and other Internet-based resources have many of the characteristics necessary for persuasive communication and may, in fact, constitute a hybrid channel that combines the positive attributes of interpersonal and mass communication. The notion that the Internet features many of the persuasive qualities of interpersonal communication makes it a prime candidate for the application of key behavioral science theories and principles to promote healthier behaviors. The broad reach that the Internet shares with many mass communication channels indicates an economy to Internet-based efforts to communicate with large audiences. It is concluded that if the Internet can be used for persuasive health communication and its reach continues to expand, it is time for public health professionals to explore the design and evaluation of Internet-based interventions directed at health behavior change.

Within the field of public health, much attention has been devoted to potential uses of the mass media to modify attitudes, shape behavior, and generally persuade audiences to protect their health (Amezcuca, McAllister, Ramirez, & Espinoza, 1990; Hornik, 1989; Wallack, 1989). However, where newspapers, magazines, radio, and television have been used to modify health practices, research indicates that these mass media are not very compelling channels for effecting behavior change (Backer, Rogers, & Sopory, 1992; McQuail, 1987; Rogers, 1983; Rogers & Storey, 1987). Although mass media channels have proven capable of reaching and informing large audiences, interpersonal channels have been more successful in influencing attitudes and motivating behavior change (Backer et al., 1992; Rogers & Storey, 1987). For health educators, the practical implication of this research is that mass media channels are appropriate for creating awareness, but interpersonal interactions are essential for persuading individuals to adopt health-promoting behaviors.

In the past few years, the Internet has emerged as a unique and prominent medium, with more than 30 million users in the United States alone and an annual growth rate of about 100% (Nielsen Media Research, 1997; Graphic, Visualization, & Usability Center (GVU), 1997). The global computer network's current users are concentrated in the United States, have an average age of 33 years, and are mostly (66%) male (GVU, 1997).

Address correspondence to Michael M. Cassell, Department of Health Behavior and Health Education, CB #7400, Rosenau Hall, Room 308, School of Public Health, University of North Carolina, Chapel Hill, NC 27599-7400, USA.

Although the average household income of network users has dropped slightly in the past year, it remains high, at \$69,000 (Public Broadcasting System, 1997). By the year 2000, as many as 250 million people are expected to have Internet access (GVU, 1997).

Public health professionals are currently seeking to take advantage of the Internet's capacity to serve as a virtual clearinghouse for health information (Chamberlain, 1996). Health statistics and disease information are widely available to health professionals and the public through the Internet, and investigators are beginning to explore the channel's capacity to foster "virtual" communities by enabling persons with common health interests to maintain electronic contact (Chamberlain, 1996; Shannon & Dwyer, 1996). Nevertheless, little has been done to take advantage of the Internet's potential as a site for public health intervention and research (Chamberlain, 1996). Most notably, there is a lack of Internet-based research directed at encouraging users to pursue healthier behaviors. This limited attention to the Internet as a site for public health intervention may be due partially to the perception that it is another form of mass media and is therefore limited in its capacity to facilitate behavior change. Yet, to focus narrowly on the Internet's impressive reach and storage capacity, and to consider it simply a new and popular mass medium, may be to overlook important characteristics that portend a much greater promise for the channel. In fact, the ability of the Internet to provide immediate, transactional feedback suggests that it can be used as a global conduit for health communications and, therefore, as a potentially powerful medium for conducting and evaluating large-scale interventions aimed at modifying health-related behaviors.

In this article, we propose a theoretical rationale for using the Internet as a channel for public health communications. We examine the concept of persuasion from a theoretical perspective, positing that the World Wide Web and other Internet-based resources have many of the characteristics necessary for persuasive communication and may, in fact, constitute a hybrid channel with attributes of interpersonal and mass communication. We then consider the applicability of key behavioral science theories and principles to Internet-based health communications. The Internet's broad reach allows Internet-based programs to communicate with large audiences. If the Internet can be used for persuasive health communication and its reach continues to expand, then it makes good sense for public health professionals to consider issues in the design and evaluation of Internet-based intervention for health behavior change.

The Nature of Persuasive Communication

The relevance of persuasive communication to health educators lies ultimately in its proposed effect: change in an individual's attitudes toward specific behaviors (Simons, 1976; Smith, 1982). While there is not consensus on a definition of attitude, there is agreement that attitudes are composed of evaluations of people, events, products, policies, institutions, or behaviors (Ajzen & Fishbein, 1980; Audi, 1974; Bagozzi, 1978; Bagozzi, Tybout, Craig, & Sternthal, 1979; Breckler, 1984; Lalljee, Brown, & Ginsburg, 1984; Maze, 1973; O'Keefe, 1990). There is also agreement that attitudes are learned, relatively enduring mental states that can exert a strong influence on behavior (O'Keefe, 1990). Adoption of an attitude will not ensure that an individual will enact a specific behavior; rather, attitudes are thought to predispose individuals to choose certain actions over others (Ajzen & Fishbein, 1980; O'Keefe, 1990). Because attitudes are thought to play a major role in shaping and predicting behavior (Ajzen & Fishbein, 1980; O'Keefe, 1990), and because these mental states are thought to be resilient (Kelman, 1961; Smith, 1982), persuasive communications

are considered capable of providing individuals with internal cues to engage in healthier behaviors (O'Keefe, 1990).

The key to the proposed effectiveness of persuasion as a form of social influence lies in its ability to effect the internalization of specific attitudes (O'Keefe, 1990; Smith, 1982). In writing about the nature and impacts of different forms of social influence, Kelman (1961) defined internalization as the private acceptance of external influence such that individuals perceive the influence as compatible with their preexisting attitudes. These preexisting attitudes play a determining role in how people respond to health communications and other forms of social influence. Kelman argued that, over time, internalized attitudes cue behaviors in the absence of external influence, obviating a continued need for external pressures and prompts (Kelman, 1961). Thus, persuasion can effect enduring change in individuals' attitudes, and consequently it has the capacity to effect behavior change.

The social influence literature distinguishes between persuasive and coercive forms of influence. Coercive forms of social influence can effect behavior change more directly and immediately than persuasive forms, which emphasize internalization (Kelman, 1961; Smith, 1982). However, persuasion has distinct practical advantages over coercion that extend beyond its ethical advantages. According to Kelman (1961), coercion is a less powerful form of social influence in the long term because it relies on the presence of an authority figure to activate and reinforce behavior. Suppose, for example, that an employee who smokes decided to quit smoking at work because she believed that failure to comply with workplace antismoking policies would have negative repercussions. In this example, smoking cessation is situation specific and contingent on the employee's concern about detection by superiors or coworkers. However, since the decision not to smoke was driven by a context-specific perceived need to comply rather than by a deeper internal evaluation that smoking is unhealthy and undesirable, the employee could continue to smoke in other contexts (Kelman, 1961; Smith, 1982). In this case, a persuasive intervention aimed at encouraging individuals to adopt and internalize attitudes that would undermine smoking behavior might prove more fruitful.

For a health communication to be persuasive, it must be both transactional and response dependent. Communication is transactional when it allows for give and take between persuader and persuadee and allows both parties to bring something to the exchange (Smith, 1982). Thus, to be persuasive, a communication must (a) motivate the receiver to actively attend to messages and perceive and interpret their content, (b) include iterative and transactional solicitation of feedback from audience members, and (c) activate elaboration of message arguments and counterarguments to encourage individuals to move through the process of attitude change (McGuire, 1978, 1989; O'Keefe, 1990; Smith, 1982). The persuasive process requires that individuals "tune in" to a message, attend to its content, comprehend its arguments, agree with what they hear, yield to the advocated positions, and retrieve the adopted attitudes for future applications to decision making and action (McGuire, 1978, 1989). As Smith (1982, p. 5) notes, "with each exchange of messages, the participants grow and change . . . thus, from a transactional point of view, the process of persuasion is characterized by a spiral of changing feelings and beliefs on the part of each communicator."

A second and related dimension of persuasive communication is its response dependence. Because attention to, adoption of, and elaboration of a specific message depend on the participation of the receiver of a persuasive communication, persuasion must be viewed as a receiver-driven process that is dependent on a series of responses from the per-

suadee (Simons, 1976; Smith, 1982). To take this argument to its logical conclusion, “we do not persuade others at all; we only provide the stimuli with which they can persuade themselves” (Simons, 1971, p. 232). Therefore, a communicator can send persuasive messages without the intent to persuade and can fail to persuade when the intention is present. The recipient of a persuasive message is always free to participate or not participate in the process of persuasion. However, messages perceived as relevant to or congruent with existing attitudes or needs are more likely to facilitate personal involvement in the persuasion process (O’Keefe, 1990; Simons, 1976; Smith, 1982).

Interpersonal Versus Mass Communication

That persuasion is a transactional, response-dependent process explains why previous research generally has found that mass media channels are not well suited for persuasive interventions (Backer et al., 1992; McQuail, 1987; Rogers, 1983). Most mass media channels are severely limited in their ability to provide transactional, response-dependent communication (McQuail, 1987). At best, traditional mass media channels can provide receivers with delayed feedback, usually in the form of modifications in message content and source characteristics to meet population-level market demands (McQuail, 1987; Smith, 1982). Audience members therefore have little opportunity to participate in a transactional process in which receiver-driven message clarification and elaboration occur. Even if a mass-mediated communication does appeal to an individual’s attitudes, the lengthy lag time between message receipt, market-based feedback, new message construction, and dissemination allows for deterioration in prior message relevance and recall and can result in a relapse through prior stages in the persuasive process (Smith, 1982).

In contrast to mass-mediated channels, interpersonal channels provide rapid and continuous feedback and are therefore more capable of providing transactional, response-dependent communication, thereby effecting persuasion (Backer et al., 1992; McQuail, 1987; Rogers & Storey, 1987). During interpersonal communication, the communicator can ensure receiver comprehension by asking questions and observing where understanding is faulty (Leventhal, 1973; Smith, 1982). In addition, the communicator can probe to discover sources of resistance to change, emphasize that someone like the receiver shares salient beliefs, modify message delivery to ensure that the receiver attends to the message, provide rewards for agreement, and facilitate constructive interaction between the message source and receiver (Leventhal, 1973).

A Hybrid Channel for Health Communication

With their broad reach and reliance on visual and audible communication, Internet-based resources appear to belong in the category of mass communication. However, the interactive capabilities of these resources suggest that they also share important characteristics with interpersonal communication and may therefore share its capacity for effecting persuasion. Thus, Internet-based resources can be understood as constituting a hybrid channel that combines elements of both interpersonal and mass communication. The capacity of these resources to provide immediate, transactional feedback suggests that they can be used to realize health behavior change in a manner that is similar to that of interpersonal channels, while their resemblance to forms of mass media suggests an ability to do so on a larger scale than previously considered possible.

The Internet as Interpersonal Medium

By soliciting information from individuals over the Internet and programming an Internet-linked computer to provide audible and visual feedback that is customized to be responsive to the solicited information, the Internet can be used to mimic the transactional and response-dependent qualities of interpersonal communication. An interactive cycle of specific feedback and customized response can be repeated over and over via the Internet to facilitate an individual's movement through the persuasive process. Along the way, both source and message factors can be instantly and dynamically modified to realize the persuasive advantages inherent in interpersonal channels. Graphics and video clips can be used to make the information source appear similar to the receiver, praise can be offered for receiver agreement, and the interactive process itself can be used to encourage receiver attention, facilitate message comprehension, and identify and modify potential sources of resistance to change.

To the extent that the World Wide Web and other Internet-based resources can mimic interpersonal communication, it should be possible to apply theories of health behavior on the Internet to achieve many of the persuasive benefits that these theories have brought to conventional interventions. For example, the health belief model holds that health behaviors are mediated by the perceived threat of a health outcome, the expected threat reduction caused by action, and the perceived benefits and barriers to taking action (Becker, 1974; Glanz & Rimer, 1995; Hochbaum, 1958). By providing health messages that are specific to individuals' perceived benefits and barriers, researchers have used the health belief model to promote healthier behaviors (Skinner, Strecher, & Hospers, 1994). This process of delivering messages to individuals that are based on their personal attributes is called message "tailoring" (Skinner et al., 1994). By electronically soliciting information on individuals' perceived benefits and barriers to behavior change and by delivering immediate tailored messages aimed at modifying these expectancies, the health belief model can be applied to design tailored Internet-based interventions.

Prochaska and DiClemente's stages of change model and Bandura's social cognitive theory could also be applied to Internet-based behavior change programs. The stages of change model focuses on behavior change as a process rather than an event and proposes that individuals at different stages of this process may need different messages that are specific to their situation (Glanz & Rimer, 1995; Prochaska & DiClemente, 1992). Researchers have demonstrated the effectiveness of applying the stages of change model to develop tailored interventions aimed at smoking cessation and other health-related behaviors (Glanz & Rimer, 1995). The interactive capabilities of the World Wide Web can provide for immediate, on-line assessments of individuals' stage progress and can quickly deliver relevant stage-specific messages. These characteristics indicate that the Web can accommodate stage-based interventions.

Social cognitive theory posits that behavior influences, and is influenced by, constant interactions with personal and environmental conditions (Bandura, 1978, 1986; Perry, Baranowski, & Parcel, 1990). These interactions help to shape individuals' expectancies regarding the performance of behaviors, and Bandura has noted that when individuals lack confidence in their ability to perform certain behaviors (when they lack self-efficacy) or have adverse expectations of the outcomes of these behaviors, they are less likely to engage in such behaviors (Bandura, 1978, 1986; Perry et al., 1990). However, by approaching behavior change in small steps, modeling positive outcomes of new behavior with credible role models, and demonstrating the similarities between new behavior and

previously mastered behaviors, health educators have been able to apply social cognitive theory to motivate individuals to pursue healthier activities (Perry et al., 1990). What is required is an understanding of each individual's attitudes regarding the behavior and the creation of messages that target these attitudes (Perry et al., 1990). The Internet's interactive capabilities render the channel well suited to this type of transaction, and the World Wide Web can be used to provide individuals with many of the components social cognitive theory suggests are essential for behavior change. Visual and audible cues can be used to provide individuals with knowledge, model necessary skills, modify limiting expectancies, and increase self-efficacy through appropriate reinforcement and support (Perry et al., 1990).

The Internet as Mass Medium

Like traditional mass media formats, the Internet has the capacity to economically reach large and geographically diffuse audiences. Radio, television, and print media have demonstrated their enormous capacity for message dissemination, and public health professionals have used these channels to expand the reach of their interventions (Alemi & Higley, 1995; Amezcua et al., 1990; Campbell et al., 1994; Chamberlain, 1996; Hornik, 1989; Maibach & Holtgrave, 1995; Rogers & Storey, 1987; Wallack, 1989). From the broadcasting of public service announcements over the airwaves (DeJong & Atkin, 1995; Pierce, Anderson, Romano, Meissner, & Odenkirchen, 1992; Siska, Jason, Murdoch, Yang, & Donovan, 1992), to the creation of school- and clinic-based educational computer programs (Gillispie & Ellis, 1993; Hahn & Nicholson, 1986; Lapham, Henley, & Kleyboecker, 1993; Lieberman, 1992; Skinner, Siefried, Kegler, & Strecher, 1993), to the development of health-oriented newsletters and magazines (Anonymous, 1992a, 1992b; Hazel, 1992; McFall et al., 1993), there are currently many examples of using mass media channels for health promotion.

Internet-based resources could similarly be used to deliver theory-based health communications to the general population. Members of a target audience need not know how to use a computer—or even have access to one—to have access to video, audio, and text-based information supplied through the Internet. The technology already exists to supply individuals with high-speed Internet connections through their home television sets. User-friendly interfaces such as touch screens, voice recognition, and hand-held remote controls can be used instead of keyboards to interact with programs on the Internet. Thus, the Internet has the potential to reach those with low computer and reading literacy levels with a wide array of visual and audible cues.

Public health interventions that use Internet-based technologies could be delivered in familiar intervention sites, such as clinics, schools, community centers, workplace settings, and the home. Indeed, in some occupational and educational settings, access to the Internet has already become commonplace. Although access is still limited for many population segments, the current trend in the Internet's growth suggests that it will become a more popular, pervasive, and accessible form of media in the next decade (Chamberlain, 1996; Nielsen Media Research, 1997; GVU, 1997). The Internet could also be used in conjunction with other interpersonal and mass media channels to expand the reach of public health programs and promote program effectiveness.

Like other forms of mass media, the Internet is a fast-paced, competitive, and increasingly commercialized medium. To compete successfully for audience attention, health-related communications have to be polished and engaging. Public health professionals

have already met this challenge by developing televised antismoking (Bal, Kizer, Felten, Mozar, & Niemeyer, 1990) and AIDS prevention (Gentry & Jorgensen, 1991; Keiser, 1991) campaigns that have been recognized widely for their production quality and commercial appeal. Internet-based health communications will similarly need strong design features and high production quality if they are to acquire and retain audience attention.

A key assumption underlying this model of intervention is that the cost of producing and disseminating such communications will be offset by the broad reach of the medium. But it should also be noted that the costs of most Internet-based health communication programs should fall well below those of televised and other mass media-based projects. Many World Wide Web sites, for example, are created by individuals in the home with their personal computers and a small annual investment to maintain a link to the Internet. The significant costs involved in providing health communications on the Internet will be associated more with the layout, design, and other production costs of the communication program than with actually placing the program on the Internet.

Conclusion

The channel characteristics of the World Wide Web and other Internet-based resources suggest that these resources constitute a hybrid channel with the persuasive capabilities of interpersonal communication and the broad reach of mass media. To the extent that Internet-based resources can mimic interpersonal communication, theories and principles of behavioral science can be applied via these resources to promote healthier behaviors. This possibility alone should merit the attention of public health professionals. But Internet-based resources also enable health professionals to disseminate persuasive health communications to an expanding global audience at relatively low cost.

The potential of Internet-based resources to marry the advantages of interpersonal and mass communication provides a strong rationale for research leading to the development of Internet-based public health interventions. Such research is needed not only to test the effectiveness of the Internet as a site for interventions that promote health behavior change but to investigate the capacity of the Internet to deliver health education information and programs for informed decision making about health-related issues. Conducting Internet-based research will present a number of methodological challenges, particularly with regard to probability sampling, measurement validity, protection of confidentiality, and other facets of ethical research involving human subjects.

Perhaps the greatest challenge to developing effective Internet-based health communications is that such endeavors require expertise in behavioral science theory, research methods, communication technology, and advertising and promotions. Although multidisciplinary teams are used widely to develop public health programs, teams having these particular disciplines are quite rare. Establishing such teams will be a necessary, challenging, and exciting aspect in the development of Internet-based public health interventions that are both salient and effective.

References

- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting behavior*. Englewood Cliffs, NJ: Prentice Hall.
- Alemi, F., & Higley, P. (1995). Reaction to "talking" computers assessing health risks. *Medical Care*, 33, 227-233.

- Amezcuca, C., McAllister, A., Ramirez, A., & Espinoza, R. (1990). A su salud: Health promotion in a Mexican-American border community. In N. Bracht (Ed.), *Health promotion at the community level* (pp. 257–277). Newbury Park, CA: Sage.
- Anonymous. (1992a). AIDS newsletters offer needed advice. *AORN Journal* 55, 1158.
- Anonymous. (1992b). Newsletters respond to AIDS and to cancer information overload. *Annals of Allergy*, 68(4), A42.
- Audi, R. (1974). A cognitive-motivational theory of attitudes. *Southwestern Journal of Philosophy*, 5(1), 77–88.
- Backer, T. E., Rogers, E. M., & Sopory, P. (1992). *Designing health communication campaigns: What works?* Newbury Park, CA: Sage.
- Bagozzi, R. P. (1978). The construct validity of the affective, behavioral and cognitive components of attitude by analysis of covariance structures. *Multivariate Behavioral Research*, 13, 9–31.
- Bagozzi, R. P., Tybout, A. M., Craig, C. S., & Sternthal, B. (1979). The construct validity of the tripartite classification of attitudes. *Journal of Marketing Research*, 16, 88–95.
- Bal, D. G., Kizer, K. W., Felten, P. G., Mozar, H. N., & Niemyer, D. (1990). Reducing tobacco consumption in California. *Journal of the American Medical Association*, 264, 1570–1574.
- Bandura, A. (1978). The self system in reciprocal determinism. *American Psychologist*, 33, 344–358.
- Bandura, A. (1986). *Social foundations of thoughts and action*. Englewood Cliffs, NJ: Prentice Hall.
- Becker, M. E. (1974). The health belief model and personal health behavior. *Health Education monographs*, 2(4).
- Breckler, S. J. (1984). Empirical validation of affect, behavior and cognition as distinct components of attitude. *Journal of Personality and Social Psychology*, 47, 1191–1205.
- Campbell, M. K., DeVellis, B. M., Strecher, V. J., Ammerman, A. S., DeVellis, R., & Strandler, R. S. (1994). Improving dietary behavior: The effectiveness of tailored messages in primary care settings. *American Journal of Public Health*, 84, 783–787.
- Chamberlain, M. A. (1996). Health communication: Making the most of new media technologies—An international overview. *Journal of Health Communication*, 1(1), 43–50.
- DeJong, W., & Atkin, C. K. (1995). A review of national television PSA campaigns for preventing alcohol-impaired driving, 1987–1992. *Journal of Public Health Policy*, 16(1), 59–80.
- Gentry, E. M., & Jorgensen, C. M. (1991). Monitoring the exposure of “America Responds to AIDS” PSA campaign. *Public Health Reports*, 106, 651–655.
- Gillispie, M. A., & Ellis, L. B. M. (1993). Computer-based patient education revisited. *Journal of Medical Systems*, 17(3/4), 119–125.
- Glanz, K., & Rimer, B. K. (1995, July). Theory at a glance: A guide for the health promotion practice. (No. 95-3896). Baltimore: National Institutes of Health. pp. 9–45.
- Graphic, Visualization, & Usability Center. (1997). *GVU's Seventh WWW Survey Results*. URL: http://www.gvu.gatech.edu/user_surveys/survey-1997-04/.
- Hahn, J. S., & Nicholson, T. (1986). The role of computers in health education: Some lessons from instructional technology. *Family and Community Health*, 9(2), 64–67.
- Hazel, C. (1992). Patient newsletters: Why do they work for some practices and not for others? *Dentistry Today*, 11(4), 82–83.
- Hochbaum, G. M. (1958). *Public participation in medical screening programs: A sociopsychological study*. Washington, DC: U.S. Department of Health Education, and Welfare.
- Hornik, R. C. (1989). Channel effectiveness in development communications campaigns. In R. E. Rice & C. E. Atkin (Eds.), *Public communication campaigns* (pp. 309–319). Newbury Park, CA: Sage.
- Keiser, N. H. (1991). Strategies of media marketing for “America Responds to AIDS” and applying lessons learned. *Public Health Reports*, 106, 623–627.
- Kelman, H. C. (1961). Processes of opinion change. *Public Opinion Quarterly*, 25, 57–78.
- Lalljee, M., Brown, L. B., & Ginsburg, G. P. (1984). Attitudes: Disposition, behaviour, or evaluation? *British Journal of Social Psychology*, 23, 233–244.
- Lapham, S. C., Henley, E., & Kleyboecker, K. (1993). Prenatal behavioral risk screening by computer among Native Americans. *Family Medicine*, 25, 197–202.

- Leventhal, H. (1973). Changing attitudes and habits to reduce risk factors in chronic disease. *American Journal of Cardiology*, *31*, 571–580.
- Lieberman, D. (1992). The computer's potential role in health education. *Health Communication*, *4*, 211–225.
- Maibach, E., & Holtgrave, D. R. (1995). Advances in public health communication. *Annual Review of Public Health*, *16*, 219–238.
- Maze, J. R. (1973). The concept of attitude. *Inquiry*, *16*, 168–205.
- McFall, S. L., Michener, A., Rubin, D., Flay, B. R., Mermelstein, R. J., Burton, D., Jelen, P., & Warnecke, R. B. (1993). The effects and use of maintenance newsletters in a smoking cessation intervention. *Addictive Behaviors*, *18*, 151–158.
- McGuire, W. J. (1978). The communication/persuasion matrix. In B. Lipstein & W. J. McGuire (Eds.), *Evaluating advertising* (pp. xxvii–xxxv). New York: Advertising Research Foundation.
- McGuire, W. J. (1989). Theoretical foundations of campaigns. In R. E. Rice & C. K. Atkin (Eds.), *Public communication campaigns* (p. 416). Newbury Park, CA: Sage.
- McQuail, D. (1987). *Communication*. New York: Longman Press.
- Nielsen Media Research. (1997). *Nielsen/CommerceNet Demographics Recontact Study*. URL: <http://www.commerce.net/nielsen/exec.html>.
- O'Keefe, D. J. (1990). *Persuasion*. Newbury Park, CA: Sage.
- Perry, C. L., Baranowski, T., & Parcel, G. S. (1990). How individuals, environments and health behavior interact: Social learning theory. In K. Glanz, F. M. Lewis, & B. K. Rimer (Eds.), *Health behavior and health education* (pp. 161–186). San Francisco: Jossey-Bass.
- Pierce, J. P., Anderson, D. M., Romano, R. M., Meissner, H. I., & Odenkirchen, J. C. (1992). Promoting smoking cessation in the United States: Effect of public service announcements on the Cancer Information Service telephone line. *Journal of the National Cancer Institute*, *84*, 677–683.
- Prochaska, J. O., & DiClemente, C. C. (1992). In search of how people change: Applications to addictive behaviors. *American Psychologist*, *47*, 1102–1114.
- Public Broadcasting System. (1997). *Life on the Internet: Internauts*. URL: <http://www.pbs.org/internet/stories/demographics/index.html/>.
- Rogers, E. M. (1983). *Diffusion of innovations* (3rd ed.). New York: Free Press.
- Rogers, E. M., & Storey, J. D. (1987). Communication campaigns. In C. R. Berger & S. H. Chaffee (Eds.), *Handbook of communication science* (pp. 817–846). Newbury Park, CA: Sage.
- Shannon, D., & Dwyer, C. (1996). Sexuality education and the Internet: The next frontier. *SIECUS Report*, *25*(1), 3–6.
- Simons, H. W. (1971). Persuasion and attitude change. In L. L. Barker, & R. J. Kibler (eds.), *Speech communication behavior: Perspectives and principles* (p. 232). Englewood Cliffs, NJ: Prentice Hall.
- Simons, H. W. (1976). *Persuasion: Understanding, practice and analysis*. Reading, MA: Addison-Wesley.
- Siska, M., Jason, J., Murdoch, P., Yang, W. S., & Donovan, R. J. (1992). Recall of AIDS public service announcements and their impact on the ranking of AIDS as a national problem. *American Journal of Public Health*, *82*, 1029–1032.
- Skinner, C. S., Siefried, J. C., Kegler, M. C., & Strecher, V. J. (1993). The potential of computers in patient education. *Patient Education and Counseling*, *22*, 27–34.
- Skinner, C. S., Strecher, V. J., & Hoppers, H. (1994). Physicians' recommendations for mammography: Do tailored messages make a difference? *American Journal of Public Health*, *84*, 43–49.
- Smith, M. J. (1982). *Persuasion and human action: A review and critique of social influence theories*. Belmont, CA: Wadsworth.
- Wallack, L. (1989). Mass communication and health promotion: A critical perspective. In R. E. Rice & C. E. Atkin (Eds.), *Public communication campaigns* (pp. 353–367). Newbury Park, CA: Sage.