



Methodological diversity and integration in health communication inquiry

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ABSTRACT

Research on health communication is complicated by myriad individual, organizational, and societal factors that influence health-related decisions and behaviors, making it difficult to control for secular trends (uncontrolled social and environmental influences) that affect health care and health promotion practices. Sophisticated research on health communication must take into account the numerous situational, psychological, and societal factors to fully examine the often hidden dynamics of health care and health promotion. This essay examines major research challenges, strategies, and opportunities for making sense of the complexities of health communication processes, recommending the power of methodological diversity and integration for health research.

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1. Introduction

Health communication is an important, yet very complex, area of applied inquiry. Health communication research is designed to increase knowledge about the challenges confronted in the delivery of health care and the promotion of health. Such knowledge is desperately needed for enhancing the quality of health care and health promotion efforts [1–3]. Yet, research on the role of communication in health care and health promotion is complicated by the myriad individual, organizational, and societal factors that influence health-related decisions and behaviors, making it difficult to control for secular trends (uncontrolled social and environmental influences) that affect health care and health promotion practices [4–6]. Research on health communication processes must take into account numerous situational, psychological, and societal factors to fully examine the often hidden dynamics of health care and health promotion [7]. This essay will examine different research challenges, strategies, and opportunities for making sense of the complex influences of communication on health care and health promotion.

There is a large and growing body of health care and health promotion research that currently employs a broad range of research designs, methods, and theories [8,9]. While the traditional default gold standard for biomedical research has long been assumed to be the use of randomized clinical trial (RCT) experiments to promote research precision, control, and prediction, in reality there is great methodological diversity in health

communication and health promotion research [9–11]. Research methods employed in these areas of study include the use of many different experimental and quasi-experimental research designs, surveys of all shapes and sizes, qualitative and quantitative textual analyses, and a host of ethnographic, multimethodological, and meta-analytic research methods. There are unique strengths and weaknesses in each of these different research methods that warrant selecting the best research method (or methods) for addressing particular research questions [12–15]. Often the best approach is to combine methods into mixed method or multimethodological designs [16–18]. This essay examines the diversity of methods used for health communication research, as well as the fruitful integration of these methods for generating valid, reliable, and useful data for enhancing health care delivery and promoting public health.

2. Experimental research in health communication

The experimental design, especially the use of randomized clinical trials (RCTs), is highly valued in the health sciences as a powerful research method for establishing causality [19]. By tight manipulation of independent variables and careful measurement of antecedent dependent variables experimental researchers can strive to determine the influences of key processes on important health outcomes. There are many examples of experimental studies used in health care and health promotion research [20,21]. Yet there are significant limitations that influence both internal and external validity with the use of experimental methods, especially the use of true randomized experiments (RCTs), in health services and health promotion research [22,23].

It is difficult to fully capture the complex multifactorial nature of health communication and health promotion with experimental research, since it is difficult to represent all relevant variables in

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experimental designs, as well as due to the overuse of artificial tightly controlled experimental conditions [24,25]. There are challenges to effectively operationalizing variables in ways that really measure the concepts the variables represent; experimental researchers must endeavor to limit measurement errors to maintain high levels of internal validity [26,27]. For example, the manipulation of independent variables in experiments, such as the use of written scenarios presented to subjects to simulate different health communication situations, is usually a poor match to the reality of the specific antecedent health conditions, limiting the ecological validity (realism) of experimental tests of the influences of these variables [12,28]. There are concerns about the ethics of randomizing subjects to experimental and control conditions, especially when the experimental conditions being tested are likely to provide health care and/or health promotion benefits to subjects [11,29]. There are also concerns about the external validity (generalizability) of many of the experiments used in health communication and health promotion research, based on both the ecological validity of experimental manipulations and the representativeness of the subjects and settings studied [9,30].

Quasi-experimental designs eliminate random assignment and provide greater freedom in the use of control groups, which makes it much easier for researchers to conduct experimental studies in complex social environments [31–34]. Quasi experiments are increasingly used in health care and health promotion settings to help overcome many of the practical and ethical limitations of RCT studies [35,36]. Another helpful experimental research innovation is the direct observation of naturally changing conditions rather than active manipulation of independent variables to enhance ecological validity; this is often referred to as the use of natural experiments [37,38]. *Adaptive* interventions have also been developed as an alternative to randomized clinical trials where different dosages of certain prevention or treatment components are assigned to different individuals, and/or within individuals across time, with dosage varying in response to the intervention needs of individuals [39]. These adaptive treatment designs have been particularly useful in analyzing the impact of tailored health communication interventions [39].

Still another challenge in the use of experimental methods in health communication research involves limited depth of analysis. While experimental research enables tight control and observation of small influences and changes between closely related variables, it does not typically allow researchers to probe into the deeper meanings behind these observed phenomena. There is generally very little understanding derived through experimental research of the long history of observed phenomena, the embeddedness of these phenomena within social structures, nor the feelings health participants have for the processes under study. While experimental research remains the widely accepted standard for large-scale health care and health promotion research, there are other research methods (sometimes used in tandem with experimental research methods) that can help to provide deeper understanding of health communication processes [23].

3. Survey research in health communication

Survey research is an important and well-utilized research method by health communication scholars to examine attitudes, beliefs, and activities of groups of selected respondents [40]. Surveys are typically operationalized in several different ways in health communication research, including the use of face-to-face and telephone-based interviews, paper and pencil and computer-delivered questionnaires, and the increasingly common use of focus group interviews. Each of these survey research approaches has unique advantages and disadvantages. The use of computer-

assisted telephone interviewing equipment (CATI) allows relatively inexpensive access to geographically dispersed populations of respondents and automated data entry and analysis, but there have been growing problems with declining response rates to telephone surveys (as well as with postal-delivered surveys), that seriously threaten the representativeness of data gathered [41]. Survey researchers must develop strategies to promote effective recruitment of subjects and increase survey response rates.

Several federal agencies field recurring large national surveys to track disease incidence and health behaviors. For example, the National Cancer Institute fields the Surveillance, Epidemiology, and End Results (SEER) survey to track national trends in cancer incidence, morbidity, and mortality [42]. The Centers for Disease Control and Prevention tracks changes in health risks in the United States with the Behavioral Risk Factors Surveillance System (BRFSS) research program [43]. The National Cancer Institute also recently introduced the Health Information National Trends Survey (HINTS) to study the American public's preferences, access, and use of health information [44]. These national surveys provide important data for health communication and health promotion researchers. It is also common for health care delivery systems to conduct regular surveys of their patients to assess patient satisfaction and experiences with health care services; these patient surveys provide important feedback to health care system administrators about health care delivery issues and for refining health services [45,46].

The use of on-line surveys has received a lot of attention in recent years in the health communication and health promotion research literature [47,48]. Conducting surveys via e-mail and the Internet can save researchers a great deal of time and expense [49]. Evidence suggests that response rates for on-line surveys are at least as good as for telephone and through-the-mail surveys, and are often better [50]. The greatest limitation to the use of on-line surveys at this point in time is subject access to on-line services. There is a significant digital divide, based primarily on age, socio-economic, and educational factors, between those potential respondents who are on-line and those who do not have easy access to online information [51]. Most troubling, those individuals who do not have access to on-line information are often members of the underserved and vulnerable populations that health communication researchers need to reach with their surveys [52,53].

Another survey research application that has become very popular in health communication inquiry is the use of focus group interviews [54,55]. In focus group interviews, a group moderator leads a directed group discussion with a small group of respondents (usually between 5 and 8 members) about targeted research topics to stimulate discussion and to obtain information on the beliefs, values, attitudes, motivations, experiences, and suggestions of the participants [56]. Focus groups tend to be a more qualitative than quantitative approach to survey research that examines the content themes that develop in group interviews. It is a useful research method for encouraging respondents to disclose information, evaluate health services and products, and suggest solutions to health issues and problems [55]. However, there are often questions raised about the generalizability (external validity) and accuracy of data gathered from focus groups, as well as about potential reactivity effects between group members that can influence individual responses to questions [57–59].

In some ways the focus group research approach tends to bridge the survey method with qualitative ethnographic research methods, which also often use focus groups to study cultural groups. Similarly, in-depth personal interviews, used often in ethnographies, connect ethnographic research to the survey method. This indicates that there are many overlaps that exist between the different research methods examined here. In fact,

experimental research often depends on the use of questionnaires and surveys, as well as the use of textual analyses, for measuring independent and dependent variables. The overlaps and permeability between research methods leads to the useful combination of research methods that will be discussed as multimethodological or mixed methods research.

Interestingly one of the greatest strengths of survey research methods, their ability to tap into self-reports of the experiences of actual participants in the health care system, is also one of the method's greatest challenges facing survey researchers, to encourage respondents to provide full and accurate reports about their experiences and feelings [60]. There are serious concerns about the validity of self-response measures [61]. Are subjects really telling survey researchers the truth? Due to a number of potential response effect biases in surveys, subjects often monitor their answers, providing what they assume are the correct or best answers to survey questions, even if these answers do not truly represent their actual experiences [61,62–64]. Still other challenges to the accuracy of survey research include potential sampling biases, leading question formats, lack of standardization in survey administration across subjects, and inaccurate coding of responses [65,66]. Concerns about the validity of survey research have resulted in calls to use supplemental research methods to help reinforce and validate information gathered through surveys [12].

4. Textual analytic research in health communication

Textual analysis is an important research method used to describe and interpret the characteristics of recorded or visual messages by analyzing language, symbols, numbers, and nonverbal cues through observational research strategies such as content analysis, interaction analysis, discourse analysis, and even rhetorical criticism [16]. Generally, textual analysis research is conducted on existing records or texts, such as books, newspapers, videos, films, audiotapes, archival records, and websites that are not generated, collected, or directly influenced by the researchers [67]. This means that the data generated by analyzing these texts are immune from the validity of self-reports issue that threatens many experimental and survey studies [68,69]. However, there are concerns that textual analysis researchers be careful to gather representative texts for analysis, identify the best coding indices for analysis, and establish valid and reliable coding strategies [16].

Textual analysis of language use in medical encounters has a long history in health services research, especially with the use of interaction analysis research to study patterns of doctor–patient communication [70,71]. Discourse analysis, which provides very detailed structural analyses of the uses of language in interaction has been used to study the ways consumers and providers communicate about health and health promotion [72,73]. Recent health communication research has expanded on language analysis to study the interdependent use of both verbal and nonverbal messages in consumer/provider interactions, enriching the analysis of health care interactions [74,75].

Health communication researchers often use content analytic research to identify, enumerate, and analyze occurrences of specific messages and message characteristics embedded in relevant health texts, such as in print or electronic media, medical records, health promotion websites, and even prescriptions. For example, Anglin et al. [76] conducted an important content analysis of two alcohol industry trade newsletters to examine discrepancies and common ground with respect to alcohol policy. Logan et al. [77] content analyzed science and medical news coverage in the Los Angeles Times and the Washington Post newspapers to evaluate the ways scientists and medical professionals were portrayed in newspapers. Ribisl et al. [78] conducted a content analysis of smoking culture and lifestyle websites listed on

the Yahoo! Internet search catalog to determine whether the websites were easily accessible to youth, featured age or health warnings, and mentioned specific tobacco brands. Henderson et al. [79] content analyzed both visual and verbal references to breast or bottle feeding in newspapers and television programs to examine how breast feeding and bottle feeding were represented in the British media.

Rhetorical criticism is a systematic qualitative research method for describing, analyzing, interpreting, and evaluating the persuasive force of messages embedded within texts. There are a number of powerful rhetorical research models that are used to guide the analysis of persuasive communication in health care and health promotion. For example, Sharf [80] used a narrative model of rhetorical criticism to analyze the use of stories in speeches and written texts to influence breast cancer research and funding policies. Weldon [81] conducted a rhetorical study, based on Burke's theory of dramatism and pentadic analysis, to examine the influences of non-fiction literature depictions of the Ebola virus as a predatorial disease on public perceptions of public health. Hamilton [82] applied Chaim Perelman's theories of argumentation to guide a rhetorical analysis of an Institute of Medicine report on *Promoting Health: Intervention Strategies from Social and Behavioral Research* (2000) to consider the role of style, arrangement, and argument in the report. Rhetorical analysis provides a range of relevant analytic strategies for analyzing the influences of communication on health care and health promotion and has the potential for uncovering underlying influences on health processes.

5. Ethnographic research in health communication

Ethnography is a qualitative method for providing in-depth description and analysis of social events, often through the use of direct observations, participant-observations, and/or in-depth unstructured personal interviews with key respondents. Ethnographic work has the potential to enrich understanding of the many underlying processes and motivations that influence health and health care [83,84]. While a great strength of ethnographic research is its depth of analysis, a commonly cited weakness is the generalizability of ethnographic research results, since ethnographies are often conducted within a single health setting and usually employ purposive rather than random sampling strategies [85,86]. Care must be taken when generalizing the results of ethnographic research across populations and settings. Another concern about ethnographic inquiry is the validity of subjective interpretations of health events and processes by researchers. Some have called for intersubjective strategies for helping to validate ethnographic research interpretations [87].

There is a long tradition of studying health care systems and health behavior through ethnography [88–90]. However, until recently such research was not well-accepted within the mainstream of health care and health promotion research, and ethnographic research was rarely solicited through federal research funding [91]. Lately, though, there have been calls for more ethnographic health research, including new research funding opportunities [92]. The National Science Foundation has introduced an Ethnographic Research Training Grant [93]. The National Institutes of Health introduced a Program Announcement for Research in Methodology and Measurement in the Behavioral and Social Sciences that identified ethnographic research as an area of particular interest [94] and released a Request for Applications on Supplements for Methodological Innovations in the Behavioral and Social Sciences that specified the need for ethnographic research [95].

The use of ethnographic qualitative research methods has been gathering strength in health communication and health promotion

research [7,96,97]. For example, Ellingson [98] reports a fascinating participant observational field study conducted by in cancer clinics to identify the communication patterns used to engender teamwork. Ellerbeck et al. [99] conducted a direct observation study of physician–patient encounters in 38 physician offices to better understand colorectal cancer (CRC) screening practices in primary care. Leydon et al. [100] conducted a revealing ethnographic study using in-depth personal interviews with 17 patients with cancer diagnosed in the previous 6 months to explore why cancer patients do not want or seek information about their condition beyond that volunteered by their physicians. These studies provide important insights into the underlying influences on health communication behaviors.

6. Multimethodological research in health communication

Multimethodological designs, often referred to as mixed methods research, have helped researchers capture many of the complexities of health communication processes through triangulation of data, while overcoming many of the individual limitations of different research methods [17,101]. Nutbeam [18,102] and others [13,103,104] recommend using multimethodological research designs for evaluating the complex array of variables involved in health communication interventions. While the use of mixed methods is certainly more complex than single method research, the development of succeeding phases of research using different methods can inform research, with data from earlier research phases being incorporated into later phases. Borkan [105] explains that multimethodological research often integrates qualitative and quantitative techniques for data collection and/or analysis, with qualitative data collection strategies (such as interviews, focus groups, or participant observations) often used in early exploratory (hypothesis formation) research phases and more quantitative methods (such as surveys, content analyses, and experiments) used subsequently to isolate and measure observed changes and correlations in key variables. While the complexity of integrating methods adds to the strength of multimethodological research, it also adds to the complexity of organizing and conducting mixed methods studies. Researchers must take into account the additional time, resources, and coordination they will need to conduct mixed methods research in health care and health promotion.

Multimethodological research designs have been employed in recent years to examine complex health communication and health promotion models, theories, and processes. For example, Query and Wright [106] report a multimethodological test of the relational health communication model [107] using ethnographic critical incident interviews in combination with on-line and paper questionnaires to examine relationships between social support, communication competence, and perceived stress in a study of well-elders, elderly individuals with cancer, and their lay caregivers. Livingood et al. [108] used a combination of ethnographic analyses and survey research to study tobacco possession law enforcement practices in four selected counties in Florida. Papp et al. [109] conducted a multimethodological study combining focus group interviews and questionnaires to identify and model the effects of sleep loss and fatigue on resident-physicians' professional lives and personal well-being. Ross et al. [110] report a multimethodological evaluation of integrated nursing teams using a combination of time diaries, questionnaires, and semi-structured interviews. Kreps [111] conducted an intricate multi-phase mixed method intervention study of nurse turnover and retention in an urban hospital by combining the use of in-depth personal interviews, questionnaires, focus group interviews, archival analysis of institutional records, and a natural experiment to compare nurse retention rates before and after the intervention at

the intervention hospital and four control group hospitals. In this study the in-depth interviews informed the topics used in the focus group interviews and led to the development of the intervention that was tested. Mixed methods research has the potential to increase the sophistication and influence of health communication research.

An important approach to multimethodological inquiry has focused on community-participatory research in health communication [112–114]. Community participatory research seeks to fully involve community members as equal partners in developing and implementing health promotion interventions to increase the accuracy of data collected and the power of health communication [115,116]. It typically involves multiple research methods, including ethnographic research to increase understanding of the unique characteristics and orientations of the intervention community. For example, Ammerman et al. [117] examined the expectations and satisfaction of pastors and lay leaders regarding a research partnership in a randomized trial guided by community-based participatory research for influencing health and dietary habits within an African American community. Naylor et al. [118] reported an evaluation of a community-based participatory research heart health project, the British Columbia Heart Health Demonstration Project, that utilized both a population heart health approach and a community mobilization model for promoting public action on heart health. Quigley et al. [119] conducted a community participatory research program to assess nuclear risks with Native-American community members and to promote community-based hazards management planning. Community participatory research, while complex and sometimes cumbersome to administer, shows great promise for effectively translating health communication research into practice, as well as for increasing both the participation and sustainability of health intervention programs.

7. Meta-analysis in health communication research

Meta-Analysis is a powerful empirical method for analyzing secondary research data [120]. It works by pooling together and statistically analyzing together the data from a number of similar studies that have used similar research measures as a way to combine findings and reach larger conclusions. Stroup et al. [121] explain that meta-analysis research helps to fill the tremendous need to synthesize results from the quickly growing body of research literature in communication and health promotion inquiry to enable timely and informed decisions in public health and clinical practice. Marsh et al. [122] advocates approaching meta-analysis as a theory-testing scientific method rather than as merely a set of rules for statistically analyzing large datasets. They argue that the focus of meta-analysis should be on analyzing large datasets to understand and explain important health communication phenomena and the key processes underlying them [122,123]. Yang [124] suggests that meta-analysis is a valuable research method not only for guiding practice, but also for promoting health communication and health promotion theory by advancing knowledge from important research areas. Care must be taken, however, to make sure that the studies that are combined in meta-analytic research used similar strategies for operationalizing and measuring variables because the combination of incommensurate datasets for analysis would inevitably invalidate any results obtained. Another common issue that arises in meta-analysis of several studies, each with independent treatment and control groups, is to test for the homogeneity of effect sizes, which can be accomplished with the use of statistical procedures such as the Welch-type test [125].

Meta-analysis has been used as a particularly valuable method for informing important health communication policy issues. For

example, Ku [126] conducted a meta-analysis of research on the value of breast self-examination (BSE) to inform decisions about promoting BSE. Logan et al. [127] conducted a meta-analysis of research examining social and contextual factors related to HIV-risk behavior for women to suggest future directions for HIV-prevention and intervention research and practice. Witte and Allen [128] conducted a meta-analysis of the research literature on the use of fear-appeal campaign interventions, suggesting that the use of strong fear appeals in health promotion campaigns produces high levels of perceived severity and susceptibility, and are more persuasive than low or weak fear appeals. Horta et al. [129] conducted a meta-analysis of evidence on the effect of maternal smoking on early weaning, finding that maternal smoking does lead to early weaning. These meta-analytic studies have clear implications for developing health communication interventions and policies.

8. Discussion and conclusions

Health communication is an important, vibrant, and diverse area of research that utilizes a broad range of different, yet often complementary, research methods. Research in this area has great potential to inform health policy and practice, ultimately helping to save lives and increase quality of life [130]. The very importance of this research area mandates that great care be taken to make sure that health care and health promotion research generates valid, reliable, and relevant data to inform health care administrators, providers, and consumers [131]. Care must be taken to utilize research methods that most effectively address the specific research questions posed and provide researchers with both the precision and depth of analysis to reach meaningful conclusions for guiding interventions.

Translating health promotion research into sustainable practice has often been raised as a key issue of concern [1,8,132,133]. Issues of poor ecological validity and limited accuracy of measurement can limit the applications of health communication research [12]. There have been calls for economically based analyses of the viability of interventions in real-world settings, providing specific data about the feasibility and costs of health interventions as well as realistic assessments of what works and why across targeted groups, under different conditions, and across diverse settings [8]. Other scholars have advocated macro-social approaches to studying health behavior within social contexts to increase our understanding of how to apply health communication interventions in society [134,135].

Due to the many complexities inherent in health communication processes, researchers need to select research methods that will allow them to fully examine multiple variables and influences on health [136]. This essay has reviewed the use of experimental, survey, textual analytic, ethnographic, multimethodological, and meta-analytic research in health communication, identifying unique strengths and limitations to each approach. Quantitative and qualitative approaches to health care and health promotion research provide differing, but also complementary, levels of research control, precision, prediction, and depth of analysis, indicating the great value of combining quantitative and qualitative measures in health care and health promotion research [54,83,137]. Researchers are encouraged to utilize the best available methods for answering specific research questions. The diversity of available research methods provides researchers with many tools for conducting high quality health communication research.

Mixed-method (multimethodological) research has been shown to provide particular strengths in helping to overcome many of the limitations of individual research methods and strengthening the overall validity of research results [83,105].

Multimethodological research lives up to the systems theory principle of requisite variety that suggests that the best reactions to complexity match the complexity of any initial condition with the responsive process [138]. Meta-analysis shows particular promise as an empirical method for combining data from many studies to reach larger conclusions for guiding health communication interventions and policies. With the advent of careful, thoughtful, and rigorous research planning and implementation, I look forward to a future of increasingly powerful, valid, and relevant health communication research that will make significant contributions to public health.

Conflict of interest

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