HEALTH INFORMATION ON THE INTERNET:

INFLUENCE OF ONLINE SOURCES ON

CREDIBILITY AND BEHAVIORAL INTENTIONS

A Thesis in

Mass Communications

by

Yifeng Hu

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The thesis of Yifeng Hu was reviewed and approved* by the following:

S. Shyam Sundar  
Professor of Communications  
Thesis Adviser  
Chair of Committee

Mary Beth Oliver  
Professor of Communications

Heidi Hatfield Edwards  
Assistant Professor of Communications

Linda A. Wray  
Assistant Professor of Biobehavioral Health and Women's Studies

John Nichols  
Professor of Communications  
Associate Dean for Graduate Studies and Research

*Signatures are on file in the Graduate School
Abstract

Drawn from Sundar and Nass’s source typology, this dissertation examines the influences of online health information sources on users’ perceived credibility of information and behavioral intentions towards information. Specifically, it explores (a) the effect of the type of selecting source (website vs. bulletin board vs. blog vs. homepage vs. Internet), (b) the effect of the type of original source (doctor vs. layperson), and (c) the interaction between the type of original source and the type of selecting source.

Pretest 1 ($N = 213$) prepared two messages used in the main study. Pretest 2 ($N = 16$) tested the experimental stimuli. A $2 \times 2 \times 5$ (message) × (original source type) × (selecting source type) full factorial experiment was conducted online among 555 randomly assigned participants.

The study yielded a significant main effect for the type of selecting source on behavioral intentions. Respondents were more likely to take action based on the information sourced from a website than from a blog, a homepage and the Internet. The effect was mediated by perceived level of gatekeeping and perceived information completeness.

The research also produced a significant two-way interaction between the type of original source and the type of selecting source on perceived credibility, mediated by perceived appropriateness of source placement. When the information was posted on a website, it was rated much higher in credibility if it was attributed to a doctor than to a layperson. When the information was presented on a homepage, it was rated slightly
higher in credibility if it was attributed to a layperson than to a doctor. However, the two-way interaction differed as a function of message.

The research contributes to literature on online sources by generating a new online source typology based on perceived level of gatekeeping. In addition, it indicates that perceived level of gatekeeping predicts behavioral intentions. It reinforces dual process models by suggesting that source and source placement are powerful cues in information processing. Practical implications for online health planners, physicians, users and policy makers are discussed, followed by limitations and suggestions for future research.
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Health information is critical to health-related decisions (Owen, Fotheringham, & Marcus, 2002). However, patients constantly complain that information from traditional venues does not meet their needs. For example, Boberg et al. (2003) found that the greatest unmet need for prostate cancer patients is information, compared to care delivery and support needs. Driven by this need, many, if not most, patients proactively seek information on their own instead of waiting for their next appointment with the doctor to obtain answers. One of the most popular venues for obtaining such information is the Internet.

The Internet has become a common tool for health information seeking. According to a series of national surveys by the Pew Internet & American Life Project (2002b, 2005, 2006a), 80% of the adult Internet users in America have searched online for information on at least one major health topic. This number has become stable since 2002. In an email interview conducted by Rubel (2006), Susannah Fox, Associate Director of the Pew Internet & American Life Project, said: “…The Internet is a place where people find reassurance about their health care decisions… So much health care decision-making happens outside the doctor's office, and apparently a lot of it is happening near a computer.”

A few studies have addressed users’ psychological and behavioral consequences after being exposed to health information sourced from the Internet in general. A meta-analysis of 25 published surveys showed that for those who used the Internet, health
information found there influences their decisions, and patients were highly satisfied with the Internet as a health information source (Eysenbach, 2003). For instance, Raupach and Hiller (2002) reported that people with breast cancer were mostly satisfied with information from the Internet than from other media, such as television, newspapers, magazines, and radio. Bass et al. (2006) found that Internet use of health formation is associated with patient task behaviors as well. Specifically, newly diagnosed cancer patients who used the Internet to seek information about their disease were more active in asking their doctors questions than nonusers. Based on the findings of a daily tracking survey on American’s use of the Internet, the Pew Internet & American Life Project (2006a) reported that almost three-quarters of the online health seekers felt reassured that they could make proper health care decisions during their last online health information search; more than half felt confident to raise new questions or concerns with their doctors about a health issue, relieved or comforted by the information they found online, and eager to share their new health or medical knowledge with others.

The above-mentioned studies examined the Internet as a whole when exploring users’ perceptions and behavior outcomes of online health information. However, looking further, health information on the Internet is sourced from varied venues. Anyone and everyone can post material on different online sites. For example, a college-going woman might give her peers some advice on how to deal with acne on a beauty forum. In fact, there are a wide variety of sources of online health information, including health information websites run by organizations, homepages owned by individual doctors, online support groups where people who share the same or similar health concerns
actively exchange health information, and blogs (short for Weblogs) authored by health advocates, caregivers, or those pursuing self-help.

Although online health information sources are diverse, it is not clear whether users differentiate between these sources while obtaining, perceiving, and acting upon health information on the Internet. Studies on users’ assessment of online health information credibility have focused on health information websites so far (e.g., Eastin, 2001; Flanagin & Metzger, 2007). Some scholars did touch upon other venues of online health information delivery, such as online support groups (e.g., Wang, Walther, Pingree, & Hawkins, 2006; Wright, 2000); however, these researchers confounded information credibility with medium credibility in measurements (see chapter 2 for details). Furthermore, despite the burgeoning of blogs, and the fact that most blog directories include health blogs, the researcher of this dissertation study was not able to find any formal research on health blogs except a tentative attempt by Sundar, Hatfield-Edwards, Hu and Stavrositu (2007). Much media and scholarship attention has been paid to political blogs or news blogs (e.g., Johnson & Kaye, 2004; Reese, Rutigliano, Hyun & Jeong, 2005). Even worse, there was little research about how users perceive and act upon health information transmitted via blogs by the time the study was conducted. Hence, scholars call for research on user-led self-help channels in addition to professionally-run systems (e.g., Bass, 2003; Eysenbach, Powell, Englesakis, Rizo & Stern, 2004; Hardey, 2001; Powell, Lowe, Griffiths & Thorogood, 2005), particularly perceived credibility of information within peer-to-peer virtual communities (Wright & Bell, 2003).
Research has long shown that communication sources may affect communication effectiveness, such as change in opinion (Hovland & Weiss, 1951). Will sources impact users’ evaluations of online health information credibility? Does users’ likelihood of acting upon health information they consume online vary depending on sources of information? Research on questions like these is likely to speak to the psychological aspects of online health communication. This dissertation intends to answer these questions by examining the influences of different online health information sources on users’ perceived credibility of information and behavioral intentions towards information.

Chapter 2 reviews the relevant literature and explicates the definitions of sources, identifies the independent variables investigated in the study, and outlines the dependent variables, namely, perceived credibility of information and behavioral intentions towards information. A set of hypotheses emerging from theoretical reasoning as well as empirical evidence is then presented. Chapter 3 introduces two pretests that aim to prepare materials – health messages and experiment stimuli – for the main study. The dissertation then describes the method (chapter 4) and results (chapter 5) of an experiment conducted to test the proposed hypotheses. Chapter 6 discusses both theoretical and practical implications of the findings, followed by directions for future research.
Chapter 2

Literature Review

Source

As briefly introduced in chapter 1, online health information is sourced from various venues, such as health information websites run by organizations, homepages owned by individual doctors, online support groups where people who share the same or similar health concerns actively exchange health information, and blogs authored by health advocates, caregivers, or those pursuing self-help. In fact, online sourcing is a complicated task. For example, suppose that you read an article about breast cancer written by a doctor on a health information website. When asked what the source of the article is, you might give different answers: “a doctor,” “a health information website,” “a doctor on a health information website,” or just “the Internet.” Your diverse answers, each representing a distinct layer or type of source, illustrate the complexity of online sourcing.

Merriam Webster’s online dictionary defines source as “one that initiates” or “one that supplies information.” These two definitions precisely differentiate a source that originates information and a source that provides (but not necessarily initiates) information. Sundar and Nass (2001) called these two layers of sources original source and selecting source.

An original source is a person who originates information. Traditional communication process models adopt this concept of source – a source produces a message that is transmitted by a channel to a receiver (e.g., Berlo, 1960; Schramm, 1954;
Shannon & Weaver, 1949). In the aforementioned example, the doctor is the original source of the breast cancer message.

From a psychological point of view, however, source is what the receiver imagines the source to be (Sundar & Nass, 2001). Scholars (e.g., Chaffee, 1982; Sundar & Nass, 2001) have noted that information receivers do not differentiate clearly between a person who produces information and a media channel that delivers information. The latter is often perceived as a source by receivers. It is more than a medium of transmission; it is a selecting source – a source which selects and relays information that is generated from an original source (Sundar & Nass, 2001). In the case of the breast cancer article, it is the health information website which selects the article to be published. Therefore, the website is the selecting source of the message.

In fact, not only do receivers perceive selecting source as source, but research on communication effectiveness has also sometimes confounded selecting source with original source. For example, Hovland and Weiss (1951) compared periodical publications (selecting source) with individual writers (original source) in their study of source credibility.

Original source is the first layer of source and selecting source is the second. While at times original source alone is sufficient in spreading information, in mass communication, both layers of sources co-exist (there are cases where original sources are unknown to receivers, but not selecting sources). The answer of “a doctor on a health information website” in the above case embodies the combination of these two layers of sources.
Source Typology

Compared to original source, selecting source is more complicated, especially in the new media environment. As mentioned in chapter 1, in cyberspace virtually anyone and everyone can select information created elsewhere and disseminate it to a mass audience. Realizing the complication of online selecting sources, Sundar and Nass (2001) forwarded a typology of communication sources (see Figure 2-1). Based on who or which entity is perceived to be the source of information, the typology includes three basic categories of selecting sources: visible sources, technological sources, and receiver sources.

Visible sources are “the sources seen by the receiver to be delivering the message or content” (Sundar & Nass, 2001, p. 58). Oftentimes, visible sources are perceived by receivers as originators of information, although they are primarily information gatekeepers, e.g., newspaper reporters, TV news anchors, or the collective editing staff of news organizations in the form of a brand logo (e.g., CNN).

Technological sources are technological interfaces that are psychologically perceived as being originators of information by receivers, regardless of the fact that they are not independent, e.g., TV sets or computer terminals (Reeves & Nass, 1996). Moreover, using certain programs and algorithms, technologies or machines are fully capable of selecting information. For example, news items on “Google News” are selected and ranked by computers that evaluate how often a story appears online. Google
News exemplifies technological sources (Sundar, Knobloch-Westerwick, & Hastall, 2007).

The typology proposes that even receivers of information can become sources, especially in online settings. For example, users in online discussion groups decide which topic they want to discuss and what information they want to consume. In this case, receivers in the traditional communication models are in fact selecting sources of information. Based on the level of analysis, receiver sources are further classified as audience as source and self as source, referring respectively to receivers as collective and as individual users. Audience as source is represented by collaborative filtering of information, while self as source is embodied by customization of information.

Applying Source Typology to Online Health Information

Sundar and Nass (2001) investigated whether the various types of communication sources identified in the typology elicit distinct psychological reactions from communication receivers. Therefore, they conducted an experiment to look for differences in receivers’ ratings of credibility, liking, quality, and representativeness (trustworthiness) of online news stories as a function of the type of communication source. They suggested that future research should apply their source typology to communication content other than news. This study applies their typology to the specific domain of online health information.

In Sundar and Nass’s (2001) study, visible sources, technological sources and receiver sources (audience as source and self as source) were operationalized as “news editors,” “computers,” “other users” and “the user himself or herself,” respectively. Sundar and Nass proposed that future research should examine specific sources instead of
broad classes of sources. For example, instead of operationalizing visible sources as
“news editors,” which are at the collective level, future studies might explore visible
sources at various levels. This dissertation research looks at visible sources at different
levels of analysis, namely, the collective level and the individual level.

There are at least three types of visible sources that select online health
information: websites, homepages, and blogs. Health information websites, run by non-
profit or for-profit organizations, are probably the most widely used online health
information sources. Since health information is selected by the collective editing staff of
websites, websites represent visible sources at the collective level.

When a website is published by or features an individual user, it is usually
referred to as a homepage. Homepages owned by medical doctors or laypersons who are
interested in health issues are also visible sources of online health information to
receivers. However, a homepage is a visible source at the individual level.

Another visible source of online health information is one of the most recent and
deﬁned blogs as Web pages whose frequently updated content is arranged in reverse
chronological order and archived. According to a blogger callback survey with 233 self-
identiﬁed bloggers from previous surveys conducted for the Pew Internet & American
Life Project, 8% of American adult Internet users, or about 12 million people, maintained
a blog, and 39%, or about 57 million people, read blogs (Pew Internet & American Life
Project, 2006b). Although only 1% of the bloggers reported that they chose health
problem or illness as the primary topic of their blogs, the absolute number of health blogs
was still considerable (120,000 by February, 2006). Moreover, most blog directories list
health blogs as a separate category, which implies that blogs are becoming an important source of online health information. A blog is usually authored by an individual; therefore, blogs are regarded visible sources at the individual level.

Qualitative and quantitative studies have long shown that people mostly use search engines to locate online health information (Eysenbach & Köhler, 2002; Houston & Allison, 2002; Pew Internet & American Life Project, 2002a, 2002b, 2006a). It is yet to be discovered whether users notice the three types of visible sources once search engines lead them to one of the sources, i.e., whether they are aware if the health information they just read was sourced from a website, a homepage, or a blog. Take the example drawn earlier in this chapter. You were asked what the source of the breast cancer article was. If you answered “the Internet,” you most probably regarded the Internet as an autonomous source of this article. In the context of online health information, “the Internet” is the operationalization of technological sources.

The production process of traditional media is driven and constrained by either limited space (for print media) or limited spectrum (for broadcasting media), so media professionals perform the information selection task. For example, newspapers editors need to trim articles to fit the space and think of good headlines to fit into narrow column widths; sometimes, only one single picture that captures the core of a story may be used due to the scarcity of the space. Because of these scarcities, there is little room for audience to act as selecting sources of information.

On the contrary, the Internet provides virtually infinite spaces and spectrums. Not only may long texts be presented and numerous photos and multimedia products be posted, but there is plenty of room for information receivers to select content. One
example is online support groups, which bring together people with similar concerns and problems (Lasker, Sogolow & Sharim, 2005).

Content analytical studies have indicated that the majority of the messages posted by users of online support groups involved discussion about health issues (e.g., Ginossar, in press; Klemm, Reppert, & Visich, 1998; White & Dorman, 2000). Users find these groups attractive because there is no time-pressure, no geographical boundary, convenient access, anonymity and lack of judgment. Moreover, information is diversified in online support groups as heterogeneous people know more different things (Walther & Boyd, 2002). In fact, some scholars have reported that online support groups are ranked more informative than visits to doctors’ offices (Boberg et al., 2003; Ferguson, 1999). For example, Ferguson conducted a survey of members of a large online service for people with chronic and serious illnesses. Online support groups were rated as “the best source of technical medical knowledge,” even more highly regarded than specialist physicians and primary care doctors.

There are many forms of online support groups, such as email-based newsgroups, web-based discussion boards, and chat rooms (Eysenbach, 2003; Lacoursiere, Knobf, & McCokle, 2005). In this study, online support groups are operationalized as bulletin boards. Unlike the email-based newsgroups or listservs which one needs to register with to join, bulletin boards are directly accessed through search engines, and are therefore more easily accessed by online health information searchers.

Based on the above discussion of different types of selecting sources of online health information, an online health information source typology (part) is formulated. Figure 2-2 is a visual representation of this typology.
The typology is incomplete because it only represents the second layer of online information source, i.e., selecting source. As described earlier, the first layer is original source. While selecting sources exhibit various forms online, original sources come in a variety of forms as well. Unlike in traditional health communication where medical professionals monopolize health information, general users of the Internet, or laypersons, are active contributors to online health information. Research has shown that online users do not simply select information; they create it – 44% of U.S. adult Internet users are also content creators on the Internet (Pew Internet & American Life Project, 2004a). In fact, the Internet in general is created and updated by general users. Therefore, online health information selected by each of the abovementioned selecting sources can be produced by at least two types of original sources: a health professional or a layperson. A full online health information source typology is thus developed as shown in Figure 2-3.

Psychological Outcomes

Sundar and Nass (2001) found psychological differences in users’ perceptions towards online news as a function of different online sources defined in their typology. In addition to credibility perception of information, this dissertation research examines more health-related psychological consequences that might be influenced by sources, i.e.,
behavioral intentions towards information. Before research questions and hypotheses are developed, a brief overview of the two outcome variables that are of concern in this study is presented below.

**Perceived Credibility of Information**

With the boom in online health information-seeking, concerns have been raised over the quality of health information obtained online (e.g., Cline & Haynes, 2001; Karp & Monroe, 2002; Peterson, Aslani, & Williams, 2003; Sonnenberg, 1997). Numerous quality assurance strategies, such as accreditation, certification, ratings systems, and posting of seals and logos, have been developed in response (Eng, 2001). However, some researchers have pointed out that the quality of online health information is probably not lower than that obtained from traditional media; rather, the rating systems employed by the empirical studies assessing the quality of online health information are problematic (Eysenbach, Powell, Kuss, & Sa, 2002). Moreover, Gagliardi and Jadad (2002) found that many incompletely developed rating instruments, in the form of logos similar to “awards” or “seals of approval” and appearing prominently on the health information websites on which they were bestowed, continued to appear on the websites even when the organizations that gave rise to them no longer existed.

As Gagliardi and Jadad (2002) put it, quality is a construct for which there is no gold standard; therefore, it might not be an achievable goal to assess the quality of online health information. Purcell, Wilson and Delamothe (2002) stated in an analogous way: “...Quality, like beauty, is in the eye of the beholder, and it is users’ views we should be seeking” (p. 558). In fact, Rosenvinge, Laugerud, and Hjortdahl (2003) argued that
whether consumers feel able to trust the online health information is as important a quality criterion as more objective criteria.

At least one researcher has pointed out that the lack of interest in public perceptions and attitudes of the information is a serious omission in studies of online health information usage (Gunter, 2005). Instead of looking at the objective measure of the quality of information, this study examines how users perceive the quality of information, to be more specific, perceived credibility of information.

Perceived credibility is a multi-faceted construct that could be explored on different levels (see Metzger et al., 2003 for a review). Specifically, there are three lines of credibility research in communication scholarship. The first dimension is source credibility. Studies on source credibility focus on a message source’s perceived ability (expertise) or motivation (trustworthiness) to provide accurate and truthful information (e.g., Burgoon, 1976; Hovland, Janis, & Kelley, 1953; Hovland & Weiss, 1951; McCroskey & Richmond, 1996; Nan, 2006; Tormala & Petty, 2004).

The second line of credibility research is medium credibility. Research on medium or channel credibility assesses the degree of trust people have in certain media, such as newspapers, television, magazines, radio, and the Internet (e.g., Barning & Trammell, 2006; Johnson & Kaye, 2002, 2004; Newhagen & Nass, 1989; Stavrositu & Sundar, in press; Walther, Wang, & Loh, 2004), as well as deals with cross-media comparisons of users’ credibility perceptions (e.g., Newhagen & Nass, 1989; Kiouissis, 2001).

Research has suggested that message credibility is also a dimension of credibility (Eastin, 2001; Flanagin & Metzger, 2007; Sundar, 1998, 1999, 2001), which refers to
aspects of the message itself, e.g., information quality, accuracy, currency and language intensity (Metzger et al., 2003). This dissertation research focuses on message credibility, to be more specific, users’ perceived credibility of health information attributed to different online sources.

**Behavioral Intentions towards Information**

The ultimate goal of e-health communication lies in its ability to demonstrate positive behavior changes (Ahern, Kreslake, & Phalen, 2006). In an interview conducted by Ahern et al., a behavioral psychologist pointed out that most people seeking health information are in the early stages of behavior change\(^1\). Therefore, the relationship between exposure to online health information and behavior change has gained emerging research interest.

For example, a nationally representative, random sample telephone survey of 1,209 young Americans aged 15-24 found that, among the 75% of all 15-24 year-olds who have used the Internet to find health information, a significant number of youth reported taking action because of the health information they got online, such as talking with friends about the information (69%), changing their behavior (39%) or visiting a health professional (14%) (Kaiser Family Foundation, 2001). Similar findings were obtained from a cross-sectional survey of Singaporeans with single-stage simple random cluster sampling method: The vast majority (91.7%) reported having taken some health-related action in response to the health information obtained online, such as improving one’s lifestyle, seeking more information from a doctor or encouraging someone to see a

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\(^1\) According to the transtheoretical model, people who are in the early stages of behavior change are those who intend to change within the next six months (the contemplation stage) and those who intend to take action in the immediate future, usually measured as the next month (the preparation stage) (Prochaska, Redding, & Evers, 2002).
doctor, and making a treatment-related decision (Siow et al., 2003). Another survey among Norwegian Internet users using a representative sample found that nearly one third of the respondents reported taking health action as a result of the information presented on the websites (Rosenvinge, et al., 2003).

Findings from the above surveys are subject to self-report. To confirm that online health information-seeking has an effect on behavior change towards the information sought, however, a longitudinal study or an experiment followed immediately by the measurement of the actual behavior should be conducted. As an alternative to the above two research methods, scholars have turned to measuring respondents’ behavioral intentions as a close predictor of actual behavior.

Fishbein and Ajzen (1975), in their well-cited theory of planned behavior (TpB), argued that behavioral intentions are the best and most proximal psychological predictor of actual behavior. TpB maps out the three key variables that drive behavioral intentions: attitude, norm and self-efficacy. Persuasion research has shown that attitudes might be influenced by source of communication (e.g., Chaiken, 1987; Chaiken, Liberman, & Eagly, 1989; Petty & Cacioppo, 1986). Therefore, it is reasonable to expect a relationship between source and behavioral intentions as well. And since behavioral intentions are the best internal predictor of behavior, this study looks at behavioral intentions towards information attributed to different sources, to get a close understanding of the relationship between sources and actual behavior change.

Research Questions & Hypotheses

Based on the full online health information source typology, this study investigates 1) whether there are psychological differences as a function of sources
conceptualized in the new typology, i.e., selecting source, original source, and source combination; 2) if so, what the underlying mechanisms are. In other words, the research examines the relationships between sources and the two psychological outcomes described above, and explores factors that might mediate these relationships.

Selecting Source

What is the influence of selecting source, i.e., websites, bulletin boards, blogs, and homepages, on perceived credibility of information and behavioral intentions towards information? For example, do people perceive health information sourced from a website as more credible than the same information sourced from a homepage? Does health information attributed to a blog predict greater behavioral intentions towards the information than the same information attributed to a homepage? Hence,

RQ1a-b: What is the relationship between the type of selecting source and users’ (a) perceived credibility of information and (b) behavioral intentions towards information, when the information is held constant?

In the following paragraphs, the possible reasons why the two psychological variables might differ as a function of selecting source are discussed, followed by the formulation of hypotheses.

Perceived Level of Gatekeeping. The key function of selecting source is to perform a gatekeeping role. Psychologist Kurt Lewin (1947) coined the concept “gatekeeper” in the theory of channels and gatekeepers, which was developed as a means of understanding social changes in communities. Lewin suggested that his theory of how
items are selected or rejected could be applied to the flow of news. Applying the
gatekeeping theory, Shoemaker, Eicholz, Kim and Wrigley (2001) conceptualized
gatekeeping as

“the process by which the vast array of potential news messages are
winnowed, shaped, and prodded into those few that are actually transmitted by the
news media. It is often defined as a series of decision points at which news items
are either continued or halted as they pass along news channels from source to
reporter to a series of editors” (p. 233).

Shoemaker et al. (2001) found that no individual-level force, i.e., individual
media workers’ characteristics, was related to the quantity of coverage a certain news
event received; however, collective-level force, i.e., editors’ aggregated assessment of the
newsworthiness of that event, was positively correlated with the quantity of coverage.
Their findings suggested that collective level editing forces are more successful in
winning the competition to determine what becomes news than are individual editors. In
other words, information selected collectively has more chance to be consumed by the
mass audience than information selected individually.

The difference between individual editors and a group of editors as gatekeeping
forces in the news industry might influence readers’ perceptions of health information
from these two sources. As mentioned earlier, visible sources in this study are examined
at two levels of analysis – the collective level and the individual level. A collective level
visible source is exemplified by health information websites, while an individual level
visible source is represented by homepages and blogs. Health information from a website
is usually prepared by a group of editors, while information from a homepage or a blog is
often distributed by one single editor – the owner (author) of the homepage or the blog. Online health information searchers might perceive that websites have more editorial control over information than homepages or blogs do, which might lead to a more favorable perception of information, i.e., greater credibility. A series of 26 single-gender focus groups with 157 English-speaking students aged 11-19 years from the U.K. and the U.S. suggested that participants were very cautious of health information provided by individuals through homepages (Gray, Klein, Noyce, Sesselberg, & Cantrill, 2005).

Based on the criterion of perceived level of editorial gatekeeping, it is tempting to assume that health information on a bulletin board would be perceived as less credible than that on a website, as a bulletin board does not have as much, or as rigorous, editorial control as a website. However, this may not be necessarily true.

Haas and Wearden (2003) argued that there is a shift in gatekeeping functions on the Internet, where responsibility for judging the content and accuracy of information transfers to online information users. This move of the gatekeeping function from editors, i.e., visible sources, to other users, i.e., receiver sources, opens a new page in the research on gatekeeping. For example, gatekeeping roles can be performed by moderators of virtual communities, as well as members of virtual communities (Barzilai-Nahon, 2006).

Definitions of gatekeeping have also been expanded in online settings. Barzilai-Nahon (2006) argued that referring to gatekeeping only as a selection process underrates the importance of the process in networks and more specifically in virtual communities. According to Barzilai-Nahon (2005, 2006), gatekeeping is not just about information selection; correcting inaccurate information by other users, or deleting misinformation by moderators of virtual communities also typifies the gatekeeping function of sources.
Based on the new understanding of gatekeeping, it is difficult to say that information from receiver sources, to be more specific, bulletin boards, will be perceived as less credible than information from websites, since at least two different entities perform gatekeeping roles on bulletin boards: moderators and other users. It is also difficult to predict which weighs more in receivers’ perceptions, editorial gatekeeping, moderator gatekeeping, or other user gatekeeping, since there is almost no literature comparing these three levels of gatekeeping.

It should be noted that although blogs are categorized as visible sources, they are unique in that they share some of the features of bulletin boards as well as personal homepages. Although blogs tend to have a dominant contributor (the blog author) like homepages, Blanchard (2004) argued that blogs have the capacity to become virtual communities. For example, bloggers may link to others’ sites and interact with readers through comments sections. In fact, comments\(^2\), trackback links\(^3\), and blogrolls\(^4\) reveal a blogger’s social connections (Su, Wang, Mark, Aiyelokun, & Nakano, 2005).

While information from blogs, as that from homepages, is basically controlled by individual editors (blog authors), blogs are characterized by peer review (Johnson & Kaye, 2004), with bloggers and readers often pointing out mistakes in an effort to increase the accuracy of the information presented (Scott, 2004a, 2004b). In this sense, blogs are similar to bulletin boards. Therefore, it can be presumed that users might

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\(^2\) Comments are readers’ reactions to a blog post. They are often accessible directly beneath the post or through a hyperlink. Comments can be anonymous and are typically posted immediately after submitted (Trammell & Kiousis, 2005).

\(^3\) A trackback is a method for the blogger to show his/her readers who else on the Internet has linked to a particular post of his/her blog. This feature is displayed similarly to the comment feature. If a blog features both trackbacks and comments, they are typically side-by-side (Trammell & Kiousis, 2005).

\(^4\) Blogrolls are a collection of links to other blogs that the blogger recommends. They usually appear on the blog’s frontpage as a side-list of links (Su et al., 2005).
perceive information from a blog as more credible than that from a homepage, mainly
due to the additional input it receives from other users.

*Perceived Information Completeness.* In addition to perceived level of
gatekeeping, another factor that might explain users’ psychological differences as a
function of selecting source is perceived information completeness. For example, a focus
group study among mothers of young children revealed that participants prefer health
sites that provide comprehensive information (Bernhardt & Felter, 2004).

Empirical research further lends support to the speculation that information
completeness might affect users’ perceptions of and behavioral intentions towards
information. Dutta-Bergman (2003a) conducted an experiment using undergraduates
enrolled in Journalism classes in a large Midwestern university to examine the impact of
Internet use motivation and health information completeness on users’ attitudes and
behavioral intentions towards the information. Although the study did not find an
interaction between Internet use motivation and health information completeness, it
showed that health information completeness significantly and substantially impacted the
attitudes towards the information, with complete information having the stronger effect
on attitudes towards the information than the incomplete information, regardless of
participants’ motivation.

Not only does the completeness of health information influence people’s attitudes
of the information, it is also an important criterion in predicting health behavior change.
The same study mentioned above showed that participants receiving complete health
information were more likely to have a positive response to the information, i.e., greater
behavioral intentions, than those receiving the incomplete information (Dutta-Bergman,
Dutta-Bergman (2004c) argued that the more complete the health information is, the better equipped the patient is in making a decision based on the information. The same study also indicated that the extent of completeness of health information on the Internet impacts consumers’ assessments of source credibility. Sources with more complete information were judged to be more credible than sources with less complete information (Dutta-Bergman, 2004c). Although the study examined source credibility, not information credibility, it is possible that people’s trust in health information increases with rising levels of completeness of the information.

This dissertation research does not examine the influence of the actual completeness of information; it looks at the perceived completeness of information obtained from different selecting sources. The degree to which users perceive information obtained from different selecting sources as complete might affect users’ perceptions of information credibility as well as health decisions, including behavioral intentions towards the information.

Flanagin and Metzger (2007) experimentally examined message credibility across four genres of sites: news organization sites, special interest group sites, e-commerce sites, and individual sites. They found that messages residing on the individual site, i.e., personal homepages, were perceived as the least credible. According to a systematic review of 30 personal homepage studies (Döring, 2002), the dominant motives for keeping a homepage are to construct one’s identity and to gain a sense of belonging. Other motives are to housekeep or to improve one’s own web competence. Because of the self-focused motive of personal homepages, information on personal homepages might be considered “specific, narrow, and less representative of others’ views.”
In other words, information from a homepage might be too personal to be as complete as that from a website, which to a large degree focuses on distributing information.

The same rationale may be applied to blogs. A blog is similar to a personal homepage in that it is a form of personal publishing. Therefore, blogs place central emphasis on the self, i.e., the blogger. According to the telephone interviews with the 233 self-identified bloggers mentioned earlier in this chapter, most bloggers view blog as a personal pursuit instead of a public endeavor: Although one-third of bloggers said they would engage their audience, and nearly nine-tenth allowed comments to be posted on their blogs, over half admitted that they posted material mostly for themselves, not for an audience. To be more specific, the main reasons for keeping a blog were creative expression and sharing personal experiences (Pew Internet & American Life Project, 2006b). These findings are consistent with what Sundar et al. (2007) found from their content analysis of mental health blogs: Most bloggers write mainly for themselves. Because of the self-construction motive of presiding a blog, information from a blog might be perceived as less complete than that from a website.

What about users’ perceptions of information completeness when the information is sourced from an online support group, such as a bulletin board, as compared to that from a website? According to Walther and Boyd (2002), providing multiple perspectives is one of the attractions of online support groups. Therefore, users might perceive information attributed to online support groups as comprising all possible views, thus more complete than that to websites.

Applying the notion of multiple perspectives to the comparison between blogs
and homepages in terms of perceived information completeness, it is clear that blogs allow a greater variety of perspectives or views than do homepages, due to their capability to become virtual communities (Blanchard, 2004). Therefore, health information from a blog might be perceived as more complete than the same information from a homepage.

*Perceived Bandwagon Effect.* Another possible mechanism that might contribute to a greater preference for bulletin boards over websites for health information might be the perceived bandwagon effect. One of the interesting findings in Sundar and Nass’s (2001) study is that “other users as source” was rated significantly higher than “news editors as source” in terms of news story liking and quality. Sundar and Nass conferred that this might be due to the bandwagon heuristic – “If everyone thinks these stories are interesting and newsworthy, they must be” (p. 68).

The bandwagon effect is widely used as a persuasion technique in advertising, political campaigns and wartime propaganda (Severin & Tankard, 2001). The fundamental idea is that since all members of a group to which they belong are accepting a certain product/candidate/program/message, they must follow the crowd and “jump on the bandwagon” (Lee & Lee, 1939, p. 105).

Only recently has the bandwagon effect received some empirical support in the context of online recommendations based on collaborative filtering. Knobloch-Westerwick, Sharma, Hansen, and Alter (2005) found that participants selected more articles from a portal if the portal provided explicit recommendations, and the strength of

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5 Examples of collective filtering recommendations: The “Most Emailed,” “Most Blogged,” “Most Searched” and “Most Popular Movies” sections on the New York Times website (http://www.nytimes.com/gst/mostpopular.html); the “Customers who bought this item also bought…” section on Amazon.
the recommendations positively predicted the time participants spent on the related articles. In their study of news cues, Sundar et al. (2007) found that respondents gave a story the highest rating when the number of related articles written about this story by other news organizations tracked by a newsbot was either lowest or highest. The authors explained that when the related article number is lowest, receivers might infer that it is a breaking story, therefore, it is of news value. When the related article number is highest, this might be due to the bandwagon effect: Participants might regard the highest number of related articles as a predictor of the importance of the story on the news media agenda.

This dissertation research measures the proposed perceived bandwagon effect to see if this heuristic cue does occur when people process online information, and if it might influence users’ perceptions of and behavioral intentions towards information.

Hypotheses on the relationship between the type of selecting source and the two psychological outcomes are drawn upon based on the above reasoning:

H1a-b: Health information will (a) be perceived as most credible and (b) predict greatest behavioral intentions when it is sourced from a bulletin board, followed by a website, then a blog, and finally a homepage.

Hypotheses for the three possible mediators are formulated as follows:

H1c-e: (c) Perceived level of gatekeeping, (d) perceived information completeness, and (e) perceived bandwagon effect will mediate the relationship between the type of selecting source and the two psychological outcomes.
Figure 2-4 visualizes the hypothesized mediators.

Insert Figure 2-4 About Here

In addition to selecting sources, this study also looks at effects of original sources of online health information. Research has shown that original sources might influence audiences’ perceptions towards information. For example, Sundar (1998) reported that respondents rated online news stories with quotes (original sources) significantly higher in credibility and quality than the same stories without quotes. As indicated in online health information source typology, online health information can originate from medical professional sources as well as laypersons. Is information perceived as more credible when it is sourced from a medical professional than from a layperson? Does information originated from a professional source predict greater behavioral intentions than the same information generated by a layperson? Are users more likely to verify information attributed to a layperson than to a professional? Therefore,

RQ2a-b: What is the relationship between the type of original source and users’ (a) perceived credibility of information and (b) behavioral intentions towards information, when the information is held constant?
There are at least two possible reasons why users’ psychological reactions might differ as a function of original sources: perceived source expertise and perceived source homophily. The following paragraphs present the arguments for each variable to generate hypotheses.

Perceived Source Expertise. Research has long identified source expertise as a primary dimension of the operationalization of source credibility (e.g., Hovland et al., 1953). In their book *Meetings between Experts*, Tuckett, Boulton, Olson and Williams (1985) argued that there are two types of expertise in the health arena. One is professional expertise, possessed by medical professionals; the other is patient expertise, which is grounded in patients’ or laypersons’ subjective experiences of health and illness.

As noted earlier in this chapter, health professionals are skeptical towards online health information quality. In fact, this doubt is to some degree rooted in the belief that medical professionals have greater expertise than laypersons. In traditional medical relationships, health professionals have overwhelming power over patients. Therefore, the authority of judgment of health information quality is solely in the hands of medical professionals (Korp, 2006).

The notion that health professionals have greater expertise than laypersons is reflected in most of the research on source expertise. For example, in Eastin’s (2001) experiment evaluating the effects of source expertise on perceived credibility of health information on a website, source expertise was manipulated such that an HIV specialist represented a source with high expertise, followed by a widow of an AIDS victim representing a moderate-expertise source, and a high school freshman exemplifying a low-expertise source. Another experiment regarded a research team from the American
Medical Association as a high-credibility (expert) source, while a student at a local high school a low-credibility (non-expert) source (Tormala & Petty, 2004).

Eastin (2001) found that source expertise affect perceptions of health information such that high-expertise sources led to higher message credibility, although the finding only held for health topics with which study participants were not familiar. Therefore, a hypothesis regarding the influence of original source on perceived credibility of information is developed:

H2a-i: Health information will be perceived as more credible when it is attributed to a professional source than to a layperson source.

However, studies on several British online support groups showed that advice from experts was not accepted uncritically and users gathered information and advice from a range of sources (Burrows, Nettleton, Pleace, Loader, & Muncer, 2000), among which were patient sources.

Even before the era of the Internet, some scholars pointed out the importance of patient expertise. Szasz and Hollender (1956) suggested that the active involvement of patients in managing health conditions might lead them to understand more about a disease than their doctors. Recent studies have revealed the rise of “smarter patients,” “expert patients,” “informed patients” and “empowered patients”, who are able to challenge the authority of doctors, manage their own health problems by developing related knowledge, become empowered through information acquisition and, as a consequence, reject the unequal doctor-patient relationship (e.g., Ferguson, 1999; Fox,
Ward, & O’Rourke, 2005; Hardey, 2001; Kivits, 2004). In fact, Ferguson (2002) suggested using the term “medical end users” to refer to these people instead of the traditional “patients.”

Patient expertise, or experiential expertise, is personal experience and knowledge interwoven with health advice within lay referral networks (Hyden, 1997). In health promotion, lay knowledge and lay perspectives have an important value (Korp, 2006). Through lay experience, patients make sense of their illness (e.g., significance and consequences) and their everyday experience of living with it. Therefore, research should stress the “salience and privileging of personal experience and lay knowledge over ‘expert’ knowledge” (Burrows et al., 2000, p. 116), which might break the professional “information monopoly” (Radin, 2006) and challenge the expert-lay actor relationship (Korp, 2006).

Personal experience and lay knowledge are appreciated by the reading public online. For example, analyses of two health bulletin boards used mostly by adolescents revealed that the bulletin boards were perceived as valuable venues of personal opinions, actionable suggestions and concrete information (Suzuki & Calzo, 2004). In the earlier mentioned focus group study among mothers of young children (Bernhardt & Felter, 2004), participants expressed preference for online parenting advice that was presented by other parents in addition to information from clinical professionals. Other similar findings could be seen in the literature (e.g., Lacoursiere et al., 2005; Wright & bell, 2003).

The Internet combines both layperson and professional sources (Gray et al., 2005). What is the relative standing of experiential expertise and professional expertise in
influencing user-evaluated information credibility? The Internet has vastly increased the presence of patient expertise; does the browsing public perceive this first-hand expertise and therefore perceive the information as more credible? Based on the literature, it is indeed an open question whether professional expertise or experiential expertise is given more weight by users while evaluating online health information credibility.

*Perceived Source Homophily.* In addition to perceived source expertise, original sources of online health information might differ in another perceptual variable: perceived source homophily. Homophily, or source-receiver similarity, increases the likelihood of communication attempts and promotes communication effectiveness (e.g., Wang et al., in press). In fact, source homophily, like source expertise, is one of the most significant types of source perceptions for most communication outcomes (McCroskey & Richmond, 1996), including perceived information credibility and behavioral intentions towards information.

Wright (2000) discovered that perceptions of similarity among online support group users may be correlated with source credibility. Wang et al. (in press) found that perceived homophily of people in online support groups drives credibility perception of information. Although Wright measured source credibility, not information credibility, and in Wang’s et al. study, Web credibility scales (Walther et al., 2004) were used to measure information credibility, it is desirable to assume that perceived source homophily might influence the perceived information credibility. To most online health information users, layperson sources might be perceived as more similar to themselves than professional sources. Based on this reasoning, an alternative hypothesis to H1a-i is developed as follows:
H2a-ii: Health information will be perceived as more credible when it is attributed to a layperson source than to a professional source.

One of the key requirements for behavior change is empowerment (Neuhauser & Kreps, 2003). The traditional top-down perspective, i.e., health messages originating from experts about people’s needs to improve themselves, may be disempowering (Smedley & Syme, 2000). While receiving information from health professionals (professional source) may be off-putting, the reciprocal interactions between peers (layperson source) might lead to more behavior change (intentions), as users might see peers as more similar to themselves than professionals. Hence, it is safe to assume the following hypothesis:

H2b: Health information will predict greater behavioral intentions when it is attributed to a layperson source than to a professional source.

Hypotheses for the two possible mediators are formulated as follows:

H2c-d: (c) Perceived source expertise and (d) perceived source homophily will mediate the relationship between the type of original source and the two psychological outcomes.

Figure 2-5 visualizes the hypothesized mediators.
Source Combination

Prior research focused on either the effect of original source (e.g., Eastin, 2001) or the effect of selecting source (e.g., Flanagin & Metzger, 2007) on users’ evaluation of online health information credibility. In reality, these two layers of sources often co-exist. Sundar and Nass (2001) suggested that different source combinations might result in different perceptual consequences. Hence,

RQ3a-b: What is the relationship between the combination of the type of selecting source and the type of original source, and users’ (a) perceived credibility of information and (b) behavioral intentions towards information, when the information is held constant?

For example, when health information is attributed to a professional source, it might be perceived as more credible if it is posed on a website than on a homepage; when identical health information is attributed to a layperson source, it might be perceived as more credible if it is presented on a homepage than on a website. This could be due to the perceived appropriateness of source placement.

Hypotheses on the relationship between source combination and the two psychological outcomes are thus created:
H3a-b: There will be a significant interaction between the type of selecting source and the type of original source. That is, (a) perceived credibility of information and (b) behavioral intentions towards information attributed to different types of selecting sources will be contingent on different types of original sources.

The hypothesis for the possible mediator is formulated as follows:

H3c: Perceived appropriateness of source placement will mediate the interaction between the type of selecting source and the type of original source on the two psychological outcomes.

Figure 2-6 visualizes the hypothesized mediator.

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*Media Experience*

The influence of some additional predictor variable should be removed prior to examining differences in the sources. One such variable is media experience.

One’s experience with a specific medium (selecting source) might influence behavioral intentions towards information sourced from that medium. For example, Rosenvinge et al. (2003) found that the probability of taking action as a result of online health information consumption was related to the frequency of visits to health websites.
Is media experience correlated to perceived information credibility as well? Little research has directly examined this relationship. However, literature on media reliance – a positive correlation between media experience and perceived medium credibility – provides a good reference. The essential idea of media reliance is that the more a person uses a particular medium, the higher he or she tends to rate the medium higher in credibility (Barning & Trammel, 2006; Flanagan & Metzger, 2000; Johnson & Kaye, 2004; Stavrositu & Sundar, in press; Wanta & Hu, 1994). For example, a survey conducted by Jupiter Research (2006) among 4,182 U.S. Internet users discovered that only a small number (21%) perceived blogs and public forums as trustworthy. Consumers were twice as likely to trust a company website or a professional review site for product information as they were to trust blogs and public forums. However, journalism researchers Johnson and Kaye (2004) conducted a survey based on a convenience sample of 3,747 blog users, and they found that blogs were seen as highly credible, more so than other online media sources (online broadcast television, online cable television news, online newspapers, online news magazines, and online radio news). It is true that these two studies compared blogs with different online sources, used different sampling techniques, and were carried out in different content settings (consumer product information versus news information). But the discrepancy in users’ perceptions of blog credibility is noticeable. This is probably because users’ had different experiences with blogs. Jupiter Research surveyed general Internet users while Johnson and Kaye’s study examined only blog users. Respondents’ perceptions of blog credibility likely differ as a result of their distinct experiences with blogs.

Based on the above review, media experience will be controlled in this study.
Chapter 3

Pretests

Two pretests preceding the main experiment of this study (see chapter 4 for more details) were conducted. The aim of the first pretest was to determine which health message(s) to use throughout the experiment (the health information was held constant in the study). The objectives of the second pretest were to (a) develop experiment stimuli (selecting sources and original sources) and (b) check manipulations of stimuli. Detailed rationales, methods, and results of each pretest are presented below.

Pretest 1

The purpose of the first pretest was to decide which health message(s) to use in the main experiment. In their classic study on source credibility, Hovland and Weiss (1951) chose topics that were both of interest to the experimental subjects and of a controversial type, in order to obtain a fairly even distribution of credibility perception among the audience. These two criteria were adopted in this study. First, the topics should be relevant to the study participants; second, the topics should be controversial enough to trigger the need for verification among readers and raise questions about source credibility.

Since the respondents in the main experiment would be college students (see chapter 4 for more details), topics relevant to college students were chosen. Research has shown that most college students are interested in searching for diet/nutrition topics on the Internet (e.g., Hanauer, Dibble, Fortin, & Col, 2004). In fact, “diet, nutrition, vitamins, or nutritional supplements” continually rank among the top three types of health
information people seek online, the other two being “specific disease or medical problem” and “certain medical treatment or procedure” (Pew Internet & American Project, 2002b, 2003, 2004b). Moreover, online health information searchers are increasingly interested in diet and nutrition information on the Internet (Pew Internet & American Project, 2005).

Accordingly, six topics that belong to the nutrition/diet category in a broad sense were identified through an online search: carbohydrates, sunscreen and vitamin D, microwaves and plastic containers, saturated fat, eating and exercise, and raw milk. These topics are somewhat controversial. Some of them are considered urban myths; others represent “alternative” views on nutrition. It is to be noted that it is beyond the scope and purpose of this dissertation as well as the expertise of the author of this dissertation to discuss the truth about the above-mentioned topics. With this in mind, relevant content from different online sources was complied and six messages based on these six topics were developed (see Appendix A for the detailed messages).

Another two topics surfaced after a conversation with the Associate Director of the University Health Services (UHS) at the Pennsylvania State University (Penn State): antibiotics and colds. The UHS observed that Penn State undergraduates often mistakenly asked for antibiotics to cure their colds. The researcher reviewed pertinent materials provided by the UHS, searched the Internet, and prepared two messages for these two topics (see Appendix A for the detailed messages).

The researcher also consulted with a professor in the Biobehavioral Health Department at Penn State on issues that might be relevant to young people. The professor recommended a then just-released Associated Press (AP) article on energy drinks, a
trendy kind of drink among young people which medical professionals have warned against. This AP article was excerpted and edited to form the last message used in Pretest 1 (see Appendix A for the detailed message).

Eastin (2001) suggested that assessing two different topics would help determine that the findings are not due to topic-specific effects. To maximize the external validity of the research, the first pretest was conducted to find the two most controversial health messages among the nine.

Method

Respondents. 213 undergraduates, recruited from six classes in the College of Communications at Penn State participated in Pretest 1. All participants received 1% extra credit of their final grades for the courses from which they were recruited. To ensure course fairness, an alternative option to earn the incentive was given to those students who were not able to participate in this pretest.

Procedure. SurveyMonkey (www.surveymonkey.com), a commercial online survey service, was used to upload the pretest questionnaires. Because there were nine health messages, to reduce the participants’ reading tedium, the researcher prepared three questionnaires, each containing three health messages. Therefore, three unique URLs for the three questionnaires were created by SurveyMonkey and were emailed by the researcher to the instructors of the six participating classes. The first URL was emailed to a large class, the second to two medium-sized classes, and the third to three small classes. The instructors passed the URLs to their students through the online course management system at Penn State after making a brief announcement about the study in their classes. Students who wanted to participate in the study could do so online any time during a one-
week period. Once participants clicked the URL, they were first taken to the implied informed consent form. After clicking upon the “Next” button, they were directed to the actual questionnaire.

*Questionnaire Design.* The three questionnaires differed only in their selections of messages. A typical questionnaire included two parts. The first part comprised of three health messages. After being exposed to the first health message, the participants rated the extent to which they found the message to be “controversial” and “needing verification” on the 10-point Likert scales ranging from 1 (*not at all*) to 10 (*extremely*). The questionnaire repeated this pattern for the second and the third health messages that followed.

The second part of the questionnaire invited participants to answer the following questions. First, a single question “Have you ever searched health information online?” measured participants’ general seeking behavior of online health information. Secondly, participants were asked to rate their health involvement after becoming an Internet user on a 10-point Likert scale ranging from 1 (*extremely decreased*) to 10 (*extremely increased*). Third, respondents’ health information consciousness was measured by asking them to rate the extent to which they agreed with the following statements on a 10-point Likert scale ranging from 1 (*strongly disagree*) to 10 (*strongly agree*):

- Living life in the best possible health is very important to me
- Eating right, exercising, and taking preventive measures will keep me healthy for life
- My health depends on how well I take care of myself
- I actively try to prevent disease and illness
I do everything I can to stay healthy.

And the health information orientation was measured the same way by the following items:

I make a point to read and watch stories about health

I really enjoy learning about health issues

To be and stay healthy it’s critical to be informed about health issues

The amount of health information available today makes it easier for me to take care of my health

When I take medicine, I try to get as much information as possible about its benefits and side effects

I need to know about health issues so I can keep myself and my family healthy

Before making a decision about my health, I find out everything I can about this issue

It’s important to me to be informed about health issues.


As mentioned in chapter 2, blogs – one of the selecting sources examined in this study – are relatively new compared to other selecting sources. Therefore, this part of the questionnaire also contained questions addressing respondents’ familiarity and experience with blogs: (a) whether participants know what a blog is, (b) whether they have ever read a blog, and (c) whether they have their own blog.

Lastly, participants’ demographic information was collected.
Before participants submitted their questionnaires by clicking the “Done” button, they were shown a debriefing message: “Please note that you should NOT believe anything you read in this study!”

Data Analysis. 4 of the 213 respondents submitted significantly incomplete questionnaires and were therefore excluded from the dataset. Data from the 209 other respondents were analyzed using JMP 6.0.2 software on a computer running Microsoft Windows. The average age was 19.87 (SD = 2.30). Seventy percent of the participants were women.

Results

Pairwise correlations showed that the two measures – “controversial” and “needing verification” – were significantly correlated, $r(209) = .60, p < .0001$. Therefore, the two items were combined as a new variable labeled “controversy.”

The results showed the sunscreen message to have the highest level of controversy ($M = 16.62$, $SD = 4.32$), followed by the milk message ($M = 13.05$, $SD = 4.42$) (see Table 3-1 for a review of the means of each message). Therefore, these two messages were selected for the main study.

In addition to the main finding, data analysis showed some interesting patterns. For example, although a convenience sample was used, it was encouraging to see that 93% of the participants reported knowing what a blog is, 82% had read a blog at least once, and 15% had their own blogs. Eighty-seven percent of the participants said that
they had previously searched online for health information, confirming that it was appropriate to use college students as the study sample. When asked if their degree of involvement in health had changed since becoming an Internet user, participants reported 6.15 (SD = 1.5) on the 10-point scale, indicating a slight increase in health involvement after they adopted Internet use. Participants’ health consciousness (M = 7.66, SD = 1.71) and health information orientation (M = 6.32, SD = 1.94) were reported beyond 5 as well.

**Pretest 2**

This study aimed to examine the effects of selecting sources, original sources and their combinations on users’ psychological outcomes. To achieve this goal, stimuli including different types of selecting sources and original sources were developed for the main study (see chapter 4 for more details). Visualized screenshots, each including three parts: the selecting source, the original source, and the message, were used to serve as the stimuli of the study.

This dissertation research is the first study of its kind. The priority is to determine the psychological effects of various online sources. To achieve this goal, the study designed minimalist screenshots with only generic forms of the various selecting sources in order to minimize noise.

It is important to the goals of the study that participants are able to identify the selecting sources correctly. For instance, they should not regard a blog as a homepage. The design of the blog screenshot should in some way match people’s perceptions of a typical blog’s appearance. Therefore, this study designed each screenshot to include the typical links that would appear in a site of that type. For example, the design included links that usually appear on a website, such as “About Us,” “Contact Us,” “Help,” and
“Site Map,” on the upper and left sides of the screenshot. Links like “My Profile,” “My Resume,” “My Articles,” “My Pictures,” “My Favorites” and “Contact Me” were used for the homepage screenshot. For the bulletin board condition, links such as “Post Reply,” “Quote,” “View All Topics,” “Newer Topics” and “Older Topics” were used to show readers that the site was a bulletin board. And typical links like “Archives,” “Previous Posts,” “Previous Comments,” “Categories,” “Blogrolls,” “Previous Blog,” and “Next Blog” were used for the blog condition. The editing work for these generic forms was done using Microsoft FrontPage 2002 and Adobe Photoshop 7.0.

The design elements of these four screenshots, such as background color, navigation bar color, text color, font, and size, were kept the same to avoid any effects resulting from the design. The layouts of the screenshots were also kept similar. The generic forms were on the upper and left sides of the screenshots, except in the bulletin board condition where the generic form appeared only on the upper side of the screenshot in order to simulate a typical bulletin board. The messages were located in the middle of the screenshots, and they were framed by the generic forms of the specific selecting sources. An identical updated time and a general search engine box were included in each of the four screenshots.

To avoid the participants’ tediousness of reading the same message four times, four different messages that scored highest on the controversy scale obtained from Pretest 1 were used: sunscreen, milk, saturated fat, and antibiotics. In order to imitate the normal appearance of online articles, a title was added for each message, namely, “Sunscreen Products Cause Disease,” “Pasteurized Milk Is Not Healthy,” “Saturated Fat Is Not To Be Blamed,” and “Antibiotics Do No Good to Curing Colds.”
Also, to avoid combination-specific effects, the four messages were combined with the four selecting sources in a way that for every participant who got the sunscreen-website combination, there was another who got the sunscreen-homepage combination, and another who got the sunscreen-bulletin board combination, and another who got the sunscreen-blog combination. Therefore, four questionnaires were developed with different combinations of selecting sources and messages.

The study designed the original source for the message to have two different levels: a professional source and a layperson source. A gender-neutral name “Chris Park” was selected as the author of the message, which was displayed on the screenshot right above the message. The only difference between a professional source and a layperson source was that the professional source condition displayed the author’s name “Chris Park,” followed by an abbreviation “M.D.,” referring to a medical doctor degree, while the layperson source condition only displayed “Chris Park.” For each type of selecting source, two levels of original sources (doctor and layperson) were created. Therefore, a total of eight questionnaires were used in the pretest.

Pretest 2 was thus conducted to (a) test the typicality of the selecting sources – whether readers view the four screenshots as typical types of selecting sources, and (b) check the manipulation of the original sources – whether readers correctly recognize the author of the message as being either a doctor or a layperson.

Method

Respondents. 13 undergraduates and 3 graduate students at Penn State participated in Pretest 2. The undergraduates, recruited from a Communications course, received one credit for research participation as one of their course requirements.
Procedure. The eight questionnaires were uploaded to the researcher’s personal Web space provided by the Penn State server, each with a unique URL. Sixteen participants were randomly assigned to the eight questionnaires, 2 participants to each questionnaire. These participants received individual emails with unique URLs to assigned questionnaires from the researcher. When the participant clicked on the URL, the first page of the questionnaire immediately displayed on screen.

Questionnaire Design. A typical questionnaire included two parts. The first part consisted of four pages, each with a screenshot representing one of the four selecting sources. The four pages were arranged in the following order: website, homepage, bulletin board, and blog.

On the first page which presented the website screenshot, participants were asked to look at the screenshot and rate the degree to which they found this screenshot to be a typical website on a 10-point Likert scale ranging from 1 (extremely atypical) to 10 (extremely typical). Due to the concern that participants might confuse a website with a personal website, i.e., a homepage, the questionnaire actually asked participants to state the degree to which they found this screenshot to be a typical organizational website. The questionnaire then invited participants to write their reasons in a text box.

This pattern was repeated for the next three pages hosting the other three selecting sources: homepage, bulletin board, and blog. One should note that this study examined personal homepages rather than homepages maintained by organizations, institutions or formal groups (e.g., the homepage of National Institute of Health). Fearing that participants might have varying understandings of the concept of a homepage, the
questionnaire asked the participants to rate the degree to which they found the homepage screenshot to be a typical personal homepage.

The second part of the questionnaire focused on the manipulation check of the original sources. To discourage the participants from returning to previous pages to check the original sources, a line appeared on the top of the fifth page warning the participants: “Please do NOT go back to the previous page as you might lose data if you do so.” Respondents were asked whether the author of the messages they just read was a “doctor” or a “layperson.” If they were not sure, they could check “I am not sure.” Again, they were asked to write their reasons in a text box that followed.

*Data Analysis.* Data from the 16 respondents were analyzed using JMP 6.0.2 software on a computer running Microsoft Windows.

*Results*

Repeated Measures ANOVA showed that the four screenshots all had ratings of more than 7 on the 10-point Likert scales measuring typicality (see Table 3-2). This suggests that participants regarded the four selecting sources as fairly typical. Specifically, the bulletin board ($M = 7.81, SD = 1.60$) was rated the most typical, followed by the homepage ($M = 7.37, SD = 1.99$), the website ($M = 7.12, SD = 1.5$), and finally the blog ($M = 7.06, SD = 2.29$), although these four screenshots were not significantly different in typicality, $F(3, 60) = 0.52, p = .66$.

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Insert Table 3-2 About Here

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The manipulation of original sources proved successful too. In the doctor source group, 7 of the 8 participants answered “doctor.” Most participants said they noticed “M.D.” behind the author’s name. The only person who answered “layperson” seemed to have noticed the “M.D.” too; however, this participant did not want to believe a doctor would have a blog or a personal homepage: “I think so because although his opinions are pretty good and he seems to be well-spoken, I do not really think a lot of doctors would blog or have a personal website like this one did.”

In the layperson source condition, 2 of the 8 participants checked “layperson,” while others chose “not sure.” This is understandable, since “Chris Park” was not identified as a layperson in the stimuli, as opposed to the case of the doctor source condition (which displayed a clear “M.D.” label). Therefore, as long as participants did not choose “Doctor” for the layperson source, the manipulation was considered successful.

In the end, the decision was to follow the design of the screenshots developed in Pretest 2, as well as the original source manipulation, for the design of the main study.
Chapter 4

Method

The purpose of this dissertation is not only to find out the psychological effects of online health information source and source combination, but also to explore possible mediating factors that could explain these effects. Specifically, this study first looks for differences in perceived credibility of information and behavioral intentions towards information as a function of selecting sources and original sources respectively, when the information is held constant. Next, this research tests whether factors such as perceived level of gatekeeping, perceived information completeness, and perceived bandwagon effect mediate the effects of selecting sources. The study also examines whether perceived source expertise and perceived source homophily mediate the effects of original sources. Finally, it inspects whether perceived appropriateness mediates the interaction between original source and selecting source.

The rest of this chapter will describe the method employed in this study. Specifically, the chapter first provided a brief overview of the participants and the design of the study. It then described the experimental treatment conditions, followed by the development of measures for each dependent variable, mediating variable, controlling variable, and manipulation check. Lastly, the chapter detailed the procedure of the study, ending with a short data analysis plan.

Subjects

555 Penn State undergraduates enrolled in several Communication and Biobehavioral Health classes participated in the experiment. Participants were told to
participate in the study only once, if they were recruited from more than one class. Participants received either extra credit or course credit as an incentive. To ensure course fairness, an alternative option to earn these incentives was given to those students who were not able to participate in this study.

**Design Overview**

A 2 (message) × 2 (original source type) × 5 (selecting source type) between subjects experiment was conducted online to investigate the effects of online health information sources on users’ perceived credibility of information and behavioral intentions towards information. A total of 20 experimental treatment conditions were created. Each participant was exposed to 1 of the 20 experimental conditions. JavaScript programming was used to assure the randomization of the participants.

**Experimental Treatment Conditions**

This experiment used two health messages developed from Pretest 1: the sunscreen message and the milk message. The sunscreen message discourages the use of sunscreen, claiming to avoid vitamin D deficiency; the milk message advocates raw milk consumption in place of pasteurized milk (see Appendix A for the detailed messages).

The original sources, operationalized as doctor and layperson, were manipulated so that “Chris Park, M.D.” referred to the doctor source and “Chris Park” referred to the layperson source, as in Pretest 2.

In addition to the four selecting sources (website, homepage, bulletin board, and blog), a control condition was added: the Internet. The Internet condition serves as a baseline selecting source: All other selecting sources reside above this source, because all other conditions in this study are sources available via the Internet.
As discussed in Pretest 2, “organizational websites” and “personal homepages” were actually used in the manipulation to refer to “websites” and “homepages.”

The manipulations of original sources and selecting sources were administered in two different ways:

1. Through textual material: The questionnaire used in this study first displayed a passage of instruction that read: “This is a screenshot of an Organizational Website/a Personal Homepage/a Bulletin Board/a Blog/the Internet. Please read the message authored by a medical doctor/a layperson as you would normally do if you came across this information online.”

2. Through screenshots: Right below the textual instruction appeared the screenshot that developed from Pretest 2. The screenshot included three parts: one of the two health messages, one of the two original sources, and one of the five selecting sources. The screenshot of the Internet condition was a simple, text-only design without any generic forms as in the other four screenshots (see Appendix B for screenshots).

The 20 experimental treatment conditions are summarized in Table 4-1.

Insert Table 4-1 About Here

Dependent Measures

There are two dependent variables in this study: perceived credibility of information and behavioral intentions towards information.
Perceived Credibility of Information

As mentioned in chapter 2, credibility is a multi-dimensional construct which is examined at different levels: the source, the medium, and the message. This study focused on perceived credibility of health information. Therefore, the credibility measure was derived from three studies examining message credibility.

Sundar’s (1998, 1999, 2001) news story credibility instrument comprised six news characteristics: accurate, believable, biased, fair, objective, and sensationalistic. Although the index resulted in a good internal consistency (Cronbach’s $\alpha = .84$), it was designed for news stories, therefore, some of the indicators might not be as applicable to health information credibility measurement as to news stories, such as “biased”, “fair”, “objective” and “sensationalistic.”

Flanagin and Metzger (2007) applied a five-item scale consisting of believability, accuracy, trustworthiness, bias, and completeness to measure the credibility of a health-related news story (Cronbach’s $\alpha = .85$). However, “trustworthiness” is an item more appropriate to measure source credibility (e.g., Hovland & Weiss, 1951) than to measure message credibility. Also, the scale includes “completeness,” a variable deemed as a potential mediator between source and perceived credibility of information in this dissertation research.

Eastin’s (2001) scale measured credibility of online health information particularly. The instrument includes three measures: accuracy, believability and factualness (Cronbach’s $\alpha = .89$).

Drawing upon the above three studies on perceived credibility of information, this dissertation research used two items that consistently emerged from the literature, i.e.,
accuracy and believability, to measure the perceived credibility of health information. Specifically, this study asked respondents to rate the extent to which they thought the information on the organizational website/personal homepage/bulletin board/blog/Internet that they just read was “accurate” and “believable” on 10-point Likert scales ranging from 1 (not at all) to 10 (extremely). Pairwise correlations showed that the two measures were significantly correlated, $r(549) = .74$, $p < .0001$.

**Behavioral Intentions towards Information**

Behavioral intentions are operationalized, in marketing research, as either a one-item construct, such as future purchase behavior (Cronin & Taylor, 1992), or a multi-dimensional one, such as purchase intentions and willingness to recommend the product or the service (Boulding, Kalra, Staelin, & Zeithaml, 1993).

A recent communication study measured behavioral intentions by asking the respondents how likely they were to recommend to another person the advice offered in the health messages they read (Wang et al., in press). The researchers did not directly measure respondents’ likelihood of acting upon the health information they received due to the concern that the health messages used in the study might not be applicable to the respondents.

The marketing and communication studies literature reviewed above suggests that measuring subjects’ likelihood of recommending information they receive is a reasonable measurement of behavioral intentions. The measurement implies that people would take action as suggested in the message if the message is applicable to them.

This study adopted a multi-dimensional method to measure behavioral intentions. That is, the study measured behavioral intentions towards information by asking how
likely the respondent was to (a) act on the advice which is offered in the message, and (b) recommend the advice he or she read in the passage to another person. Since this study examines online health information consumption, it is appropriate to include a new dimension of behavioral intentions related specifically to the online context: How likely the respondent was to (c) forward the message to his or her acquaintances online.

The three items of behavioral intentions were measured on 10-point Likert scales ranging from 1 (extremely unlikely) to 10 (extremely likely). In order to see if the above three items actually measure something in common, i.e., behavioral intentions, a factor analysis with varimax rotation was performed, which yielded a single factor with an Eigenvalues greater than one. The internal consistency of the index was high, Cronbach’s $\alpha = .87$.

**Mediating Measures**

This study also addresses the hypothesized mediators, i.e., perceived level of gatekeeping, perceived information completeness, perceived bandwagon effect, perceived source expertise, perceived source homophily and perceived appropriateness of source placement, which were all measured on 10-point Likert scales. Details are given below.

*Perceived Level of Gatekeeping*

As reviewed in chapter 2, a variety of entities, e.g., editors, moderators, users, may perform the gatekeeping role on the Internet. Also, the definition of gatekeeping has been extended from selecting and controlling information to correcting and deleting misinformation if it occurs. Therefore, participants were asked in separate questions to rate the extent to which they thought the information presented on the organizational website/personal homepage/bulletin board/blog/Internet that they just read was selected
and controlled by (a) professional editors, (b) regulators/moderators, and (c) other users. Participants were also asked to rate the extent to which they thought the information on a given selecting source that they just read would be quickly corrected and deleted by the three groups of gatekeepers, if the information contained errors.

This study formed a scale measuring the perceived level of editorial gatekeeping, which comprised the four activities of gatekeeping: selecting, controlling, correcting and deleting information (Cronbach’s $\alpha = .69$). Similar scales were formed to measure the perceived level of moderator gatekeeping (Cronbach’s $\alpha = .64$) and the perceived level of user gatekeeping (Cronbach’s $\alpha = .60$).

**Perceived Information Completeness**

Perceived information completeness was hypothesized to be a potential mediator of the relationship between selecting sources and dependent variables. This study adapted Dutta-Bergman’s (2003a, 2004c) information completeness scale, asking participants to rate the extent to which they thought the information on the organizational website/personal homepage/bulletin board/blog/Internet that they just read was “thorough,” “complete,” “comprehensive,” “extensive,” “sufficient,” “contains all the necessary elements,” and “contains sufficient evidence” (Cronbach’s $\alpha = .92$).

**Perceived Bandwagon Effect**

A single question measured the perceived bandwagon effect of selecting sources: “How likely do you think that the vast majority of people believe in the information you just read on the Organizational Website/Personal Homepage/Bulletin Board/Blog/Internet?”
Perceived Source Expertise

Since it is not clear whether perceived professional expertise or perceived experiential expertise is given more weight by users while evaluating online health information, these two areas of expertise were measured separately.

Perceived Source Professional Expertise. This variable was measured by a three-item scale adapted from McCroskey and Richmond’s (1996) measure of source competence. Specifically, this study asked participants to rate the extent to which they thought the author of the information that they just read was “an expert in the concerned area,” “informed,” and “qualified” (Cronbach’s α = .92).

Perceived Source Experiential Expertise. Drawing upon previous literature on patient expertise, this study measured the perceived source experiential expertise by asking respondents to rate the extent to which they thought the author of the information that they just read (a) “has personal experience with the issue involved,” (b) “has lay knowledge about the issue” and (c) “refers to the everyday experience of people” (Cronbach’s α = .62).

Perceived Source Homophily

The perceived source homophily was measured using McCroskey and Richmond’s (1996) measure of perceived homophily (the attitudinal homophily part). The scale included four items asking the participant his or her rating towards the author of the message, including whether this person “is like,” “is similar,” “thinks like,” and “behaves like” the participant (Cronbach’s α = .88).
**Perceived Appropriateness of Source Placement**

A single question measured perceived appropriateness of source placement: “To what extent did you find it appropriate that a medical doctor/layperson wrote on an Organizational Website/a Personal Homepage/a Bulletin Board/a Blog/the Internet?”

**Control Measure**

**Media Experience**

As reviewed in chapter 2, one’s experience with a specific medium might influence his/her perception of information and behavioral intentions towards information sourced from that medium. This study thus controlled media experience, and measured it by asking participants how often they (a) read and (b) wrote on organizational websites/personal homepages/bulletin boards/blogs/the Internet. The two items were significantly correlated, $r(549) = .53$, $p < .0001$.

**Manipulation Check Measures**

The manipulation of original source was checked by asking respondents whether the author of the message that they just read is a medical doctor or a layperson. As a manipulation check of selecting source, participants were asked whether the screenshot they just read was on an organizational website, a personal homepage, a bulletin board, a blog, or the Internet in general.

**Procedure**

The experiment was conducted online during a 12-day period. Because there were 20 experimental treatment conditions, 20 questionnaires were developed accordingly. A welcome page was created with the JavaScript programming included and linked the 20
questionnaires together. The questionnaires as well as the welcome page were uploaded on the researcher’s personal Web space provided by the Penn State server.

The URL to the welcome page was emailed to the instructors of the recruiting classes. The instructors passed the email attached with the implied informed consent form to their students through the online course management system at Penn State after making a brief announcement about the study in their classes. Students who wanted to participate in the study could choose any time in the experimental period to answer the questionnaire.

**Questionnaire**

Students initially viewed the welcome page, and after clicking the “Next” button, they were randomly directed to 1 of the 20 questionnaires. After reading the textual instruction and the message in the screenshot, on that same page, the subjects answered a list of questions regarding some message attributes, including the measures of perceived credibility and perceived information completeness. Subjects clicked the “Next” button to fill out the second page of the questionnaire, which included the measures of behavioral intentions towards information. The third page comprised questions measuring perceived level of editorial gatekeeping, perceived level of moderator gatekeeping, perceived level of user gatekeeping, and perceived bandwagon effect. A manipulation check of original sources was conducted on the beginning of the fourth page, followed by questions measuring perceived source professional expertise, perceived source experiential expertise, and perceived source homophily. The last page included a question checking the manipulation of selecting source, a question measuring perceived appropriateness of source placement, and questions regarding the participants’ media experience. The last
page also collected participants’ demographic information before they gave out their identities, which was used only for incentive purpose.

The questionnaire was turned in when participants clicked the “Next” button on the last page and saw the “thank you” page. As in Pretest 1, a line on the “thank you” page warned the participants not to take home the message they read.

**Data Analysis Plan**

The study is a 2 (message: milk vs. sunscreen) × 2 (original source type: doctor vs. layperson) × 5 (selecting source: website vs. bulletin board vs. blog vs. homepage vs. Internet) between subjects factorial design. Given that the independent variables are three nominal factors, and the dependent variables are continuous, the primary statistical procedure used to test the proposed hypotheses about the relationships between independent variables and dependent variables was factorial analysis of variance. Since media experience was controlled in this study, an analysis of covariance (ANCOVA) was actually performed. Baron and Kenny’s (1986) causal steps approach was used to test the proposed mediators. All the analyses were performed using JMP 6.0.2 software on a Microsoft Windows computer.

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6 Baron and Kenny’s model assumes a three-variable system such that there are two causal paths feeding into the outcome variable: the direct impact of the independent variable (Path c) and the impact of the mediator (Path b). There is also a path from the independent variable to the mediator (Path a). A variable functions as a mediator when it meets the following conditions: (1) variations in levels of the independent variable significantly account for variations in the presumed mediator (i.e., Path a), (2) variations in the mediator significantly account for variations in the dependent variable (i.e., Path b), and (3) when Paths a and b are controlled, a previously significant relation between the independent and dependent variables is no longer significant, with the strongest demonstration of mediation occurring when Path c is zero. In regard to the last condition, Baron and Kenny noted that in social psychology, a more realistic goal may be to seek mediators that significantly decrease Path c rather than eliminating the relation between the independent and dependent variables altogether.
Chapter 5

Results

Data Reduction

555 students participated in the study. Two outliers were detected and excluded after the Mahalanobis Outlier Distance Plot\(^7\) in JMP. A total of 553 valid responses were used for the analysis (\(N = 553\)). The average age of the participants was 20.08 years (SD = 1.72). Seventy percent were women. Seventy-seven percent were recruited from Communication classes. Eighty-six percent were self-identified as Non-Hispanic Caucasians, the rest were Asians/Pacific Islanders (5%), African Americans (4%) or Hispanics (2%).

Manipulation Checks

Among the 553 participants, only 53% passed the manipulation-check, i.e., they provided the correct answers for the manipulation-check questions pertaining to both the original source and selecting source. Independent sample \(t\) tests were conducted to determine whether there were mean differences between participants who succeeded in answering both manipulation-check questions (Group A) and those who either failed the original source manipulation check question, the selecting source manipulation check question, or both (Group B), on the two dependent variables. Analysis showed that Group A and Group B were not different in ratings of the perceived credibility of information, \(t(540) = .22, p = .82\). However, Group A (\(M = 2.14, SD = 1.55\)) gave higher ratings on

\(^7\)"Mahalanobis Outlier Distance Plot" shows the Mahalanobis distance of each point from the multivariate mean (centroid). The standard Mahalanobis distance depends on estimates of the mean, standard deviation, and correlation for the data. The distance is plotted for each observation number. Extreme multivariate outliers can be identified by highlighting the points with the largest distance values.
behavioral intentions towards information than Group B ($M = 1.88, SD = 1.34), \( t(545) = 2.08, p = .03 \).

A further examination of the original source manipulation check and the selecting source manipulation check separately revealed that the original source manipulation check was the main reason for the low pass rate of the total manipulation checks.

Seventy-eight percent of the participants passed the manipulation check of selecting source. Independent sample \( t \) tests showed that there were no mean differences between people who succeeded in the manipulation check and those who did not regarding perceived credibility, \( t(185) = .93, p = .34 \), and behavioral intentions, \( t(176) = .05, p = .95 \).

However, only 64% of the participants successfully answered the original source manipulation check question. Independent sample \( t \) tests showed that there was no mean difference between people who passed the manipulation check and those who did not in terms of perceived credibility, \( t(391) = .17, p = .86 \). However, there was a mean difference on behavioral intentions with people who passed the manipulation check ($M = 2.10, SD = 1.52$) rated higher than those who failed ($M = 1.83, SD = 1.30$), \( t(448) = 2.12, p = .03 \).

A detailed description of manipulation checks were presented in Table 5-1. Since the overall manipulation check was weak, whether participants passed the manipulation check of original source and whether they passed the manipulation check of selecting source were both controlled in the main analysis.
Main Analysis

Perceived Credibility of Information

A 2 (message: milk vs. sunscreen) × 2 (original source type: doctor vs. layperson) × 5 (selecting source: website vs. bulletin board vs. blog vs. homepage vs. Internet) full factorial ANCOVA was used to examine perceived credibility of information, controlling for media experience, original source manipulation check, and selecting source manipulation check.

The analysis yielded a significant two-way interaction between original source and selecting source, F(4, 513) = 2.30, p = .05, as shown in Figure 5-1. While the original source did not make a difference to perceived credibility of information transmitted via a bulletin board, a blog and the Internet, respondents tended to report higher credibility of information attributed to a doctor (compared to a layperson) when the information was posted on a website and lower credibility of information attributed to a doctor (compared to a layperson) when the information was presented on a homepage. Table 5-2 shows the means associated with this two-way interaction.
The analysis also generated a significant three-way interaction between message, original source and selecting source, $F(4, 513) = 3.48, p < .01$. Plotting two-way interactions between original source and selecting source by message revealed that the two-way interaction for the milk message (see Figure 5-2) was more pronounced than the two-way interaction for the sunscreen message (see Figure 5-3). The milk message was perceived as more credible on a homepage when it was attributed to a layperson source than when it was attributed to a doctor source, whereas there was no such a distinct difference for the sunscreen message when it was on a homepage. Table 5-3 shows the means associated with this three-way interaction.
Behavioral Intentions towards Information

The same $2 \times 2 \times 5$ full factorial ANCOVA was used to examine behavioral intentions towards information. The analysis produced a significant main effect for selecting source, $F(4, 512) = 3.27, p = .01$, as shown in Figure 5-4. Depending on where the information was sourced from, the levels of behavioral intentions that respondents reported were in the following order (from high to low): website ($M = 2.32, SE = .15$), bulletin board ($M = 2.12, SE = .14$), blog ($M = 1.92, SE = .16$), homepage ($M = 1.78, SE = .16$), the Internet ($M = 1.58, SE = .17$). A simple equation describes this main effect: “website $\geq$ bulletin board $\geq$ blog $\geq$ homepage $\geq$ Internet.” Mean comparisons using Student’s $t$ post hoc (see Table 5-4) showed that respondents reported significantly greater behavioral intentions towards information attributed to a website than to a blog, a homepage and the Internet.

The same analysis showed that media experience was a predictor of behavioral intentions, $F(1, 512) = 13.23, p < .001$. The more experience that participants had with a specific medium (selecting source), the higher they were to rate behavioral intentions towards the information obtained from that medium.
A significant original source manipulation check effect was also found in this analysis, $F(1, 512) = 5.48, p = .01$. Participants who succeeded in the original source manipulation check were more inclined to change behavior ($M = 2.15, SE = .10$) than those who failed the manipulation check ($M = 1.74, SE = .13$).

*Hypotheses Testing*

H1a-b: Health information will (a) be perceived as most credible, and (b) predict greatest behavioral intentions when it is sourced from a bulletin board, followed by a website, then a blog, and finally a homepage.

Since there was no significant main effect for selecting source on perceived credibility of information, H1a was not directly supported. The significant main effect for selecting source on behavioral intentions (website ≥ bulletin board ≥ blog ≥ homepage ≥ Internet) was, to a large degree, consistent with the hypothesized prediction. Therefore, H1b was largely, although not completely, supported.

H1c-e: (c) Perceived level of gatekeeping, (d) perceived information completeness, and (e) perceived bandwagon effect will mediate the relationship between the type of selecting source and the two psychological outcomes.

The perceived level of gatekeeping was operationalized as perceived level of editorial gatekeeping, perceived level of moderator gatekeeping, and perceived level of user gatekeeping (see chapter 4). Since there was a significant main effect for selecting
source on behavioral intentions, Baron and Kenny’s (1986) causal steps approach was used to test whether perceived level of each of the three types of gatekeeping was a mediator of this relationship.

There was a significant main effect for selecting source on perceived level of editorial gatekeeping, $F(4, 510) = 9.81$, $p < .0001$. The correlation between perceived level of editorial gatekeeping and behavioral intentions was significant, standardized $\beta = .28$, $F(1, 538) = 48.96$, adjusted $R^2 = .08$, $p < .0001$. When perceived level of editorial gatekeeping was added as a covariate, the original main effect for selecting source on behavioral intentions became non-significant, $F(4, 504) = 1.01$, $p = .39$. Meanwhile, there was a significant main effect for perceived level of editorial gatekeeping on behavioral intentions, $F(1, 504) = 34.82$, $p < .0001$. Therefore, perceived level of editorial gatekeeping was a mediator.

There was a significant main effect for selecting source on perceived level of moderator gatekeeping, $F(4, 506) = 10.38$, $p < .0001$. The correlation between perceived level of moderator gatekeeping and behavioral intentions was significant, standardized $\beta = .20$, $F(1, 534) = 24.12$, adjusted $R^2 = .04$, $p < .0001$. When perceived level of moderator gatekeeping was added as a covariate, the original main effect for selecting source on behavioral intentions became non-significant, $F(4, 500) = 1.66$, $p = .15$. Meanwhile, there was a significant main effect for perceived level of moderator gatekeeping on behavioral intentions, $F(1, 500) = 14.57$, $p < .001$. Therefore, perceived level of moderator gatekeeping was a mediator.

There was a significant main effect for selecting source on perceived level of user gatekeeping, $F(4, 512) = 10.86$, $p < .0001$. The correlation between perceived level of
user gatekeeping and behavioral intentions was significant, standardized $\beta = .14$, $F(1, 541) = 11.37$, adjusted $R^2 = .01$, $p < .001$. When perceived level of user gatekeeping was added as a covariate, the original main effect for selecting source on behavioral intentions remained at the same level of significance, $F(4, 507) = 3.23$, $p = .01$. Therefore, perceived level of user gatekeeping was not a mediator.

The above three mediation processes yielded two mediators of the relationship between selecting source and behavioral intentions: perceived level of editorial gatekeeping and perceived level of moderator gatekeeping. Therefore, H1c was partially supported.

Baron and Kenny’s (1986) causal steps approach was also adopted to test whether perceived information completeness was a mediator of the relationship between the type of selecting source and behavioral intentions. There was a significant main effect for selecting source on perceived information completeness, $F(4, 507) = 3.02$, $p = .01$. The correlation between perceived information completeness and behavioral intentions was significant, standardized $\beta = .50$, $F(1, 535) = 185.69$, adjusted $R^2 = .25$, $p < .0001$. When perceived information completeness was added as a covariate, the original main effect for selecting source on behavioral intentions became less significant, $F(4, 501) = 2.39$, $p = .04$. Meanwhile, there was a significant main effect for perceived information completeness on behavioral intentions, $F(1, 501) = 157.81$, $p < .0001$. Therefore, perceived information completeness was a mediator. H1d was supported.

Baron and Kenny’s (1986) causal steps approach was employed to test whether perceived bandwagon effect was a mediator as well. The main effect for selecting source on perceived bandwagon effect was not significant, $F(4, 515) = 2.09$, $p = .08$. The
correlation between perceived bandwagon effect and behavioral intentions was significant, standardized \( \beta = .38 \), \( F(1, 545) = 93.20 \), adjusted \( R^2 = .14 \), \( p < .0001 \). When perceived bandwagon effect was added as a covariate, the original main effect for selecting source on behavioral intentions became even more significant, \( F(4, 510) = 3.54 \), \( p < .01 \). Therefore, perceived bandwagon effect was not a mediator. H1e was not supported.

Figure 5-5 is a summary of the supported mediators of the relationship between selecting source and behavioral intentions: perceived level of editorial gatekeeping, perceived level of moderator gatekeeping, and perceived information completeness.

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Insert Figure 5-5 About Here

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H2a-i: Health information will be perceived as more credible when it is attributed to a professional source than to a layperson source.

H2a-ii: Health information will be perceived as more credible when it is attributed to a layperson source than to a professional source.

H2b: Health information will predict greater behavioral intentions when it is attributed to a layperson source than to a professional source.

H2c-d: (c) Perceived source expertise and (d) perceived source homophily will mediate the relationship between they type of original source and the two psychological outcomes.
Since there was no significant main effect for original source on either perceived credibility of information or behavioral intentions towards information, H2a-d were not directly supported.

H3a-b: There will be a significant interaction between the type of selecting source and the type of original source. That is, (a) perceived credibility of and (b) behavioral intentions towards information from different types of selecting sources will be contingent on different types of original sources.

Since there was a significant two-way interaction between the type of original source and the type of selecting source on perceived credibility, H3a was supported. Since there was no significant two-way interaction between the type of original source and the type of selecting source on behavior intentions, H3b was not supported.

H3c: Perceived appropriateness of source placement will mediate the interaction between the type of selecting source and the type of original source on the two psychological outcomes.

Since there was a significant interaction between the type of original source and the type of selecting source on perceived information credibility, Baron and Kenny’s (1986) causal steps approach was used to test whether perceived appropriateness of source placement mediated this interaction.
There was a significant two-way interaction between original source and selecting source on perceived appropriateness of source placement, $F(4, 515) = 5.95, p < .0001$. The correlation between perceived appropriateness of source placement and perceived credibility of information was significant, standardized $\beta = .21, F(1, 545) = 27.26$, adjusted $R^2 = .04, p < .0001$. When perceived appropriateness of source placement was added as a covariate, the original interaction between original source and selecting source became non-significant, $F(4, 510) = 1.22, p = .29$. Meanwhile, there was a significant main effect for perceived appropriateness of source placement on perceived credibility of information, $F(1, 510) = 20.53, p < .0001$. Therefore, perceived appropriateness of source placement was a clear mediator. H3c was supported.

Figure 5-6 visualizes the perceived appropriateness of source placement as a supported mediator of the relationship between source combination and perceived information credibility.

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**Results Summary**

The influences of source manipulations on the two psychological outcomes may be summarized as follows:

1. Perceived credibility of health information varied as a function of the two-way interaction between original source and selecting source. When the information was posted on a website, it was rated much higher in credibility if it was attributed to a doctor than to a layperson. When the information was presented on a homepage, it was rated
slightly higher in credibility if it was attributed to a layperson than to a doctor. This interaction was partially mediated by perceived appropriateness of source placement.

2. However, the two-way interaction differed as a function of message, since a significant three-way interaction between message, original source and selecting source on perceived credibility of information was obtained. The two-way interaction for the milk message was more pronounced than the two-way interaction for the sunscreen message. When the message was posted on a homepage, the milk message was perceived as more credible if it was attributed to a layperson than to a doctor, whereas there was no such a distinct difference for the sunscreen message.

3. Behavioral intentions towards health information differed significantly as a function of selecting source. A simple equation describes this main effect: “Website ≥ Bulletin Board ≥ Blog ≥ Homepage ≥ Internet.” Mean comparisons showed that respondents reported significantly greater behavioral intentions towards information attributed to a website than to a blog, a homepage and the Internet. This effect was partially explained by perceived level of editorial gatekeeping, perceived level of moderator gatekeeping and perceived information completeness.

Analysis Based on Manipulation Check Successful Dataset

As reported in the beginning of this chapter, many participants failed the manipulation check of original source. Fearing that the weak manipulation of original source might affect the findings from the main analysis, participants who failed either the original source manipulation check or the selecting source manipulation check or both were excluded from the main dataset; a smaller dataset with only those respondents (N = 297) who passed both manipulation checks was assembled. A 2 (message: milk vs.
sunscreen) × 2 (original source type: doctor vs. layperson) × 5 (selecting source type: website vs. bulletin board vs. blog vs. homepage vs. Internet) full factorial ANCOVA was therefore conducted, controlling for media experience.8

As found in the main analysis, this analysis revealed a significant two-way interaction between original source and selecting source on perceived credibility of information, \( F(4, 271) = 3.05, p = .01 \), and a significant three-way interaction between message, original source and selecting source on perceived credibility of information, \( F(4, 271) = 2.71, p = .03 \). Similar to the main analysis, this analysis also yielded a main effect for selecting source on behavioral intentions that approached significance, \( F(4, 271) = 2.01, p = .09 \). Media experience was also a predictor of behavioral intentions, as in the main analysis, \( F(1, 271) = 7.70, p < .01 \).

A new finding based on this analysis was a significant two-way interaction between original source and selecting source on behavioral intentions, \( F(1, 271) = 2.36, p = .05 \), as shown in Figure 5-7. While the original source did not make a difference to behavioral intentions towards information transmitted via a homepage, respondents tended to report greater behavioral intentions towards information attributed to a doctor (compared to a layperson) when the information was posted on a website, a bulletin board, and a blog, and lower behavioral intentions towards information attributed to a doctor (compared to a layperson) when the information was presented on the Internet. Table 5-5 shows the means associated with this two-way interaction.

Table 5-5 shows the means associated with this two-way interaction.

Insert Figure 5-7 About Here

8 It should be noted that the cell sizes in this analysis were unequal.
Analysis of Perceived Original Source and Perceived Selecting Source

Since some participants perceived the original source and the selecting source differently from the manipulated sources, it is interesting to see the influence of perceived, instead of manipulated, sources on the same two psychological outcomes. A 2 (message: milk vs. sunscreen) × 2 (perceived original source type: doctor vs. layperson) × 5 (perceived selecting source type: website vs. bulletin board vs. blog vs. homepage vs. Internet) full factorial ANCOVA was thus performed, controlling for media experience.\(^9\)

Similar to the main analysis, this analysis yielded a three-way interaction between message, perceived original source and perceived selecting source on perceived credibility of information that approached significance, \(F(4, 515) = 2.25, p = .06\). This analysis also revealed a significant main effect for perceived selecting source on behavioral intentions, \(F(4, 514) = 2.53, p = .03\), as the same to the main analysis. This analysis also showed, as in the main analysis, that media experience was a predictor of behavioral intentions, \(F(1, 514) = 9.28, p < .01\).

Unlike the main analysis, this analysis yielded a significant main effect for perceived original source on perceived credibility of information, \(F(1, 515) = 6.23, p = .01\), as shown in Figure 5-8. When the respondents perceived the original source to be a doctor, the information was perceived as more credible \((M = 3.91, SE = .20)\) than when they regarded the original source as a layperson \((M = 3.35, SE = .09)\).

\(^9\) It is to be noted that the cell sizes in this analysis were unequal.
Also different from the main analysis, this analysis generated a significant main effect for perceived original source on behavioral intentions towards information, $F(1, 514) = 6.40, p = .01$, as shown in Figure 5-9. The respondents were more likely to take action based on the information when they perceived the original source to be a doctor ($M = 2.34, SE = .15$) than to be a layperson ($M = 1.92, SE = .07$).

Another finding that was absent in the main analysis was a significant two-way interaction between perceived original source and perceived selecting source on behavioral intentions, $F(4, 514) = 2.33, p = .05$, as shown in Figure 5-10. Respondents tended to report greater behavioral intentions towards information that was perceived to be sourced from a doctor (compared to a layperson) when the information was perceived to be posted on a website, a bulletin board, a blog and a homepage, and lower behavioral intentions towards information that was perceived to be sourced from a doctor (compared to a layperson) when the information was perceived to be presented on the Internet. Table 5-6 shows the means associated with this two-way interaction.
Insert Table 5-6 About Here
Chapter 6
Discussion

Interpretation of Findings

Perceived Credibility of Information

The significance of the three-way interaction between message, original source and selecting source on perceived credibility of information indicates that the two-way interaction between original source and selecting source differs as a function of message. Specifically, the two-way interaction for the milk message was more pronounced than the two-way interaction for the sunscreen message. When the message was posted on a homepage, the milk message was perceived as more credible if it was attributed to a layperson than to a doctor, whereas there was no such a distinct difference for the sunscreen message.

This credibility difference might have to do with participants’ perceptions of the relevance of, and their familiarity with, the message. Dual process models such as the elaboration likelihood model (ELM; Petty & Cacioppo, 1986) hold that a person’s motivation and ability to process a given message determine the level of elaboration likelihood: How much effort one puts into processing the message. The most important determinant of motivation to process a message is the perceived personal relevance of the communication (Petty, Priester, & Brinol, 2002). People tend to process information with more effort when they perceive the information to be of greater relevance to their lives than when it is of lesser relevance. In addition, when one has more prior knowledge about a message, one tends to process the information more carefully. When a person’s
motivation or ability to process a given message is low, the communication effect will be greatly affected by heuristic cues, such as the source of the message. For example, Eastin (2001) found in his experiment that source made a significant difference in message credibility evaluation for a health topic that was unknown to participants, but not for one that was known.

Re-examination of the data from Pretest 1 indicated that the two health topics used in the study differed in personal relevance. In Pretest 1, participants were asked to rate the degree to which they concurred with the three statements on a 10-point Likert scale ranging from 1 (strongly disagree) to 10 (strongly agree): “I am interested in the topic,” “The topic matters to me,” and “I would like to learn more about the topic” (Cronbach’s $\alpha = .96$). A factor analysis with varimax rotation yielded a single factor with an Eigenvalue greater than one. These three items were summed up and labeled as “relevance.” An independent sample $t$ test showed that the sunscreen topic ($M = 20.05$, $SD = 7.77$) was perceived as significantly more relevant than was the milk topic ($M = 15.03$, $SD = 7.79$), $t(110) = 3.86$, $p < .001$.

Since participants perceived the milk topic to be less relevant than the sunscreen topic, they might have been less motivated to process the milk message than the sunscreen message and, therefore, were more influenced by heuristic cues such as the perceived appropriateness of source placement. Mediation analysis (see chapter 5) showed that perceived appropriateness of source placement might mediate the two-way interaction between original source and selecting source. Because the milk topic was less relevant to the participants than the sunscreen topic, the appropriateness heuristic was
probably more applicable in the milk message; in other words, the appropriateness cue lends itself to heuristic processing more than systematic processing of the milk message.

The two topics might also differ in participants’ prior knowledge towards these topics. Participant might be more familiar with the sunscreen topic than with the milk topic. There is a strong sun tanning culture in the U.S.; in fact, the U.S. is among the nations which have the highest rates of skin cancer (WHO, 2005). Mainstream medical professionals are consistently calling for the use of sunscreen. As a respondent reflected in her essay after participating in the study: “…There have been so many reports in magazines, journals, and newspapers on using sunscreen that it is almost ridiculous to believe this insufficient blog…” It is possible that participants had a greater ability to process the sunscreen message than the milk message because they had more prior knowledge about the sunscreen topic. Therefore, they were less influenced by source cues, such as perceived appropriateness of source placement.

While absent from the main analysis, the analysis of perceived original source and perceived selecting source (see chapter 5) yielded a significant main effect for perceived original source on perceived credibility of information. Although many respondents did not correctly get the manipulation of original source, they tended to perceive the information as more credible if they thought the information was attributed to a doctor than to a layperson. This suggests that when evaluating online health information, professional expertise of original source might still play a role, although it depends on what users perceive the original source to be, rather than what the actual original source is.
Behavioral Intentions towards Information

This research found a significant main effect for selecting source on behavioral intentions as illustrated in the following equation: “website ≥ bulletin board ≥ blog ≥ homepage ≥ Internet.” Mediation analysis showed that the effect was partially mediated by the perceived level of editorial gatekeeping and the perceived level of moderator gatekeeping. Participants perceived that information sourced from websites was controlled by editors more so than that from the other selecting sources, and information on bulletin boards was monitored by moderators more so than that from the other selecting sources. Blogs and homepages were considered lacking both editorial gatekeeping and moderator gatekeeping. Respondents might have regarded that the gatekeeping function is unknown for the Internet condition.

Another variable that mediated the relationship between selecting source and behavioral intentions was perceived information completeness of selecting source. Participants reported higher levels of information completeness towards information sourced from bulletin boards and websites than from blogs and homepages, as predicted. The Internet might be considered the catch-all source with significant amounts of information. The sample of health information chosen was clearly incomplete for the study participants.

While respondents’ behavioral intentions varied as a function of selecting source, the results from the main analysis showed a lack of significant main effect for original source on behavioral intentions. One reason might be the weak manipulation of original source.
As reported in chapter 5, the analysis of perceived original source and perceived selecting source (see chapter 5) produced a main effect for perceived original source on behavioral intentions: The respondents were more likely to take action based on the information when they perceived the original source as a doctor than when they perceived the original source as a layperson. This finding seemed to be contradictory to the source homophily argument that information from a more similar source would predict greater behavioral intentions than that from a less similar source. It could be that source professional expertise outweighs source homophily while acting upon health information.

When only the manipulation check successful cases were analyzed (see chapter 5), a significant two-way interaction between original source and selecting source on behavioral intentions was revealed. The analysis indicates that when users correctly perceived the original source and the selecting source, their behavioral intentions tended to vary based on different source combinations. A significant two-way interaction between perceived original source and perceived selecting source on behavioral intentions (see chapter 5) also suggests the existence of source placement cue in behavioral intentions.

*Media Experience*

The research observed a significant main effect for media experience on behavioral intentions. The more experience one had with a specific medium, the greater behavioral intentions towards the information obtained from that medium. This finding is supported by prior research (Rosenvinge et al., 2003).
However, this study suggested that media experience was not a predictor of perceived information credibility. This finding is consistent with what Flanagin and Metzger (2007) found in their experiment that there was no significant relationship between Internet experience and message credibility. However, prior research has shown that the more often a person uses a particular medium, the higher he tends to rate medium credibility (Barning & Trammel, 2006; Flanagin & Metzger, 2000; Johnson & Kaye, 2004; Stavrositu & Sundar, in press; Wanta & Hu, 1994). One interpretation of this seeming discrepancy is that our study, as well as that of Flanagin and Metzger (2007), measured perceived information credibility, not medium credibility. One’s trust in a certain medium may have to do with one’s overall experience with that medium. But it does not necessarily ensure that one would believe all information sourced from that medium. After all, perceived credibility of information is conceptually different from perceived credibility of medium.

User Characteristics

Gender. After analyzing seven major datasets from the Pew Internet & American Life Project, Rice (2006) reported that more frequent online health seekers were more likely to believe the health information they see on the Internet. Since use of the Internet for health information is generally more common among women than men (Hesse et al., 2005), it is possible that women tend to believe online health information more than men. However, a study based on the data from the Health Information National Trends Survey of a total of 6369 U.S. adults showed that there was no significant gender difference in respect of trusting the Internet as a general source of health information (Hesse et al., 2005).
Although this dissertation research did not hypothesize for gender differences, analysis was performed to show whether gender made a difference in respect to the two dependent variables examined in the study. While an independent sample t test did not show a gender difference on behavioral intentions towards information, \( t(335) = .18, p = .87 \), the analysis revealed a gender difference on perceived credibility of information, with men \((M = 3.77, SD = 1.89)\) giving higher ratings towards the information they read than women \((M = 3.31, SD = 1.99)\), \( t(323) = 2.51, p = .01 \). Specifically, men \((M = 3.79, SD = 1.87)\) perceived the sunscreen message as significantly more credible than women \((M = 3.16, SD = 2.03)\), \( t(144) = 2.40, p = .01 \). However, there was no significant gender difference on perceived credibility of the milk message, \( t(174) = 1.10, p = .27 \). The effect of gender on perceived information credibility seems to be moderated by the content of the message. Women might be more aware of information related to beauty and skin health. The mainstream advocacy for sunscreen usage might have impacted women’s ratings of the sunscreen message credibility more so than those of men.

Controlling for gender, the same 2 × 2 × 5 full factorial ANCOVA (see chapter 5) still yielded a significant three-way interaction between message, original source and selecting source on perceived credibility of information, \( F(4, 510) = 3.33, p = .01 \). The two-way interaction between original source and selecting source on perceived credibility of information approached significance, \( F(4, 510) = 2.13, p = .07 \). Regarding behavioral intentions, this analysis still yielded a significant main effect for selecting source, \( F(4, 509) = 3.25, p = .01 \), a media experience effect, \( F(1, 509) = 13.17, p < .001 \), and an original source manipulation check effect, \( F(1, 509) = 5.59, p = .01 \). Therefore, gender did not influence the main findings of the study.
Discipline. Nearly one-quarter of the study participants were recruited from Biobehavioral Health classes. Although data was not collected regarding participants’ health orientation, students recruited from Biobehavioral Health classes might be more health-oriented than students recruited from Communication classes.

Research has shown that trust in health information sources differs between people with more health orientation, i.e., those who hold stronger health-oriented attitudes and health beliefs, and are more health information oriented, and people with less health orientation (Dutta-Bergman, 2003b). In addition, active communication channels such as the Internet serve as one of the primary health information sources for health-conscious, health-information oriented individuals with strong health beliefs and commitment to health activities, while passive communication channels such as television and radio serve as primary health information sources for individuals who are not health-oriented (Dutta-Bergman, 2004b). Therefore, analysis was performed to see if reactions towards the same health information differed between these two groups of students.

Independent sample t tests showed that there were no mean differences between students who were recruited from Communication classes and who were recruited from Biobehavioral Health classes regarding perceived credibility of information, \( t(197) = .81, p = .41 \), and behavioral intentions towards information, \( t(193) = .34, p = .73 \). Therefore, participants’ course subjects did not seem to influence the two concerned dependent variables in the study.
Implications

Theoretical

Consistent with what Sundar and Nass (2001) found in their source typology study, this dissertation research further reinforced the concept that there are psychological differences between various online communication sources (selecting sources). However, while Sundar and Nass operationalized “visible source” as a single construct, this dissertation research found a disparity between different levels of visible sources with respect to behavioral intentions. Mean comparisons showed that respondents reported significantly greater behavioral intentions towards information attributed to a website than to both a blog and a homepage. A prominent difference between a website and a blog or a homepage is that information sourced from a blog and a homepage is basically controlled by individual gatekeepers, whereas information on a website is controlled by collective gatekeepers.

Mean comparisons also indicated that websites and bulletin boards were not significantly different in respect to behavioral intentions. Although bulletin boards belong to “receiver sources,” they share the same attribute as websites in that the gatekeeping function of information is performed collectively. On websites, the gatekeeping role is mainly played by editors, while on bulletin boards, moderators and users jointly perform the role.

Based on the above discussion, it can be conjectured that websites and bulletin boards are collective gatekeeping sources, while blogs and homepages are individual gatekeeping sources. The Internet can be considered a source without a specific level of gatekeeping (unknown gatekeeping). Therefore, the levels of selecting source are now
reduced to three: collective gatekeeping (website and bulletin board), individual
gatekeeping (blog and homepage), and unknown gatekeeping (Internet).

Based on the reduced levels of selecting source, a 2 (message: milk vs. sunscreen) × 2 (original source type: doctor vs. layperson) × 3 (selecting source type: collective gatekeeping vs. individual gatekeeping vs. unknown gatekeeping) full factorial ANCOVA was used to examine behavioral intentions towards information, controlling for media experience, original source manipulation check, and selecting source manipulation check. A significant main effect for selecting source on behavioral intentions was revealed, $F(2, 520) = 5.46, p < .01$, as shown in Figure 6-1. Mean comparisons (see Table 6-1) showed that respondents reported significantly greater behavioral intentions for collective gatekeeping source ($M = 2.21, SE = .11$) than both individual gatekeeping source ($M = 1.86, SE = .12$) and unknown gatekeeping source ($M = 1.60, SE = .17$).

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Insert Figure 6-1 About Here

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A new online source typology is thus generated, as shown in Figure 6-2. Unlike Sundar and Nass’s (2001) source typology, which was developed based on which entity is perceived to be the source of information, the new typology suggests another way to categorize online sources. Based on perceived level of gatekeeping, selecting sources can
be categorized into three groups: collective gatekeeping, individual gatekeeping, and unknown gatekeeping. Websites and bulletin boards belong to the collective gatekeeping category. Blogs and homepages fall under the category of individual gatekeeping, although blogs could be subsumed into the category of collective gatekeeping as well, due to the partial gatekeeping function provided by commenters (the dashed line in the figure). The Internet belongs to the unknown gatekeeping group.

The new online source typology may explain Sundar and Nass’s (2001) experimental finding that news stories attributed to two types of receiver sources, i.e., audience and self, were perceived differently in respect of story quality and representativeness. Respondents reported higher ratings for stories selected by audiences than by the user himself or herself. Application of the new online source typology demonstrates that it is really the different levels of gatekeeping that cause the psychological differences between these two types of receiver sources. In the new online source typology, these two types of receiver sources fall under different categories: Audience as source belongs to the collective gatekeeping group, whereas self as source the individual gatekeeping group.

In addition to the new online source typology, this dissertation research indicates that perceived level of gatekeeping predicts behavioral intentions. To be more specific, people’s likelihood of taking action based on the information they consume depends on the level of gatekeeping the information is perceived to receive. This study also clearly
reinforces dual process models by suggesting that source and source placement are powerful cues in affecting people’s information processing.

Methodological

This research was conducted in an online environment which approximated the real-life circumstances that were being studied. It has been gradually accepted that experiments on online users’ perceptions and behaviors can be conducted in an online setting (e.g., Flanagin & Metzger, 2007; Wang et al., in press), which is believed to simulate participants’ daily online information consumption situation and is considered to provide more ecological validity to the study.

The data collection technique employed in this study proved to be cost-effective and efficient. Collecting data via the Internet has many advantages. It provides more efficiency compared to traditional modes of data collection, such as the nearly complete elimination of paper, pencil, and data entry costs (e.g., Dillman, 2000). When performed correctly, online data collection techniques result in fewer errors of data entry than traditional modes. The reduced time required for both the researcher and the participants is another advantage.

The experimental manipulation of online selecting sources, i.e., the design of the screenshots, proved to be good (see Table 5-1). The manipulation check pass rate for blogs was 97%, followed by homepages (92%), websites (80%), and bulletin boards (79%). The manipulation check pass rate for the Internet condition was somehow low (47%). As mentioned in chapter 4, the Internet source, serving as a control condition, was simply manipulated through textual instructions. However, the manipulation check question asked the participants to choose one answer from a list of five options whether
the information they just read was on an organizational website, a personal homepage, a bulletin board, a blog, or the Internet. Participants might have felt obligated to choose an answer other than “the Internet,” thinking that the researcher expected them to choose a specific source rather than a general one.

This study has improved the measurement of behavioral intentions by including a new measure: the likelihood of forwarding the health message to receivers’ acquaintances online. Future studies of online health information consumption as well as online health communication effectiveness might adopt the index of behavioral intentions used in this study.

Practical

*For Health Planners.* The finding that selecting source influences behavioral intentions is especially useful to online health planners who are endeavoring to discover how online health information sources can modify individuals’ behaviors (Whitten, Kreps, & Eastin, 2005). This study suggests that websites and bulletin boards are equally effective in predicting users’ behavioral intentions towards information received from these sources. This finding is exciting as online health campaigns may be extended from websites to bulletin boards and other user-generated venues via which information transmitted is perceived to be monitored collectively, or complete.

Another practical implication for online health planners, resulted from the three-way interaction between message, original source and selecting source, is that they should pay attention to heuristic cues of information processing, such as the appropriateness of source placement, especially when participants of online interventions/preventions are not motivated or unable to process the message.
For Physicians. This research has two important implications for online physicians. First, the finding that people were less likely to change their behaviors based on information sourced from homepages and blogs than that from health information websites rings an alarm to the increasing number of physicians who deliver health information through their personal homepages and blogs. If physicians want to reach “world wide web” audiences and expect positive responses from these audiences, they should instead provide health advice on health bulletin boards, if communicating on health information websites is not possible. In fact, it is not unusual to see a medical professional facilitate discussion on a health bulletin board (Eysenbach et al., 2004). A randomized controlled trial of an 8-week, Internet-based eating disorders intervention, which included a moderated online discussion group, significantly reduced at-risk college-age women’s weight and shape concerns for up to 2 years and decrease risk for the onset of eating disorders (Taylor et al., 2006). However, if the purpose of a homepage or a blog is to communicate with physicians’ own patients, then how users perceive information posted on their own doctors' online sites or how likely users are to change their behaviors towards information they receive from their own doctors’ online sites may be more important than the "world wide web" implications.

Secondly, the weak original source manipulation indicates that many online health information seekers do not consciously notice the original source of the information they consume, or at least not very reactive to a simple “M.D.” title. This implies that while posting health information on the Internet, physicians should make their professionalism more salient, such as adding a picture of themselves in professional clothing, or including a brief profile introducing their expertise.
For Users. This study has implications for media literacy regarding online health information use as well. For example, people might be more aware of the influence of sources and source placement on their daily consumption of online health information; they may increase their knowledge on how to decide whether to forward a piece of online health information to their friends, family members or significant others.

For Policy Makers. Eng (2001) suggested that research on Internet-related technologies will help identify potential opportunities for proactive investment and policy development. This study shows a clear direction for policy making by indicating that user-generated venues with the collective gatekeeping function are good sources of online health information.

Limitations

Manipulation of Original Source

An obvious shortcoming of this study is that the manipulation of original sources was weak. Looking further, the problem lies in the manipulation of professional source. While the vast majority (97%) of the participants in the layperson condition passed the manipulation check, only 34% of the respondents in the doctor condition did so.

One of the reasons for the low pass rate of the professional source manipulation check might be that, after answering a series of questions regarding dependent variables, participants in the doctor condition did not want to believe that such controversial messages in fact came from a medical doctor. They might have wanted to avoid the “cognitive dissonance.”

Literature lends support to this explanation. Pedhazur and Schmelkin (1991) argued that checking manipulation after the measurement of the dependent variable may
create some problems. “Responses to manipulation checks may be colored by the manner in which participants responded to the measure of the dependent variable, thereby affecting the validity of the manipulation check. Participants may, for example, engage in rationalizations with respect to their perceptions of the manipulation so as to not appear inconsistent, irrational, selfish, foolish, or whatever the specific case may be” (p. 263).

In fact, the answers to the open-ended questions in Pretest 2 (see chapter 3) indicated that such an explanation is highly possible. When asked to write the reasons why they thought the author of the article was either a doctor or a layperson, one student wrote: “The blurbs say that the author is a medical doctor but technically it could be anyone just saying they are a doctor.” Another person said: “I remember medical information and remember the letters MD, however they could be misinforming.” The interesting thing is that these two people, who were in the doctor condition, still succeeded in the manipulation check. Since in Pretest 2 no questions regarding dependent variables were asked, it was less possible to trigger “cognitive dissonance.” That is probably why the original source manipulation check in Pretest 2 was strong.

Another possible explanation is that, in Pretest 2, each participant was exposed to four screenshots containing four different selecting sources (website, bulletin board, blog and homepage); the abbreviation “M.D.” for “medical doctor” thus appeared four times in the four screenshots. The mere repetition of “M.D.” might have caught and held participants’ attention. Conversely, in the main experiment participants were only exposed to one screenshot, since only one screenshot was needed for one experimental condition. Therefore respondents had only one chance to see the abbreviation “M.D.”
There is yet another explanation for this problem. The original source manipulation check was conducted on the fourth page of the questionnaire, far away from the first page where the manipulation occurred. Participants might have forgotten the label “M.D.” appeared in the screenshot as well as the textual instruction presented on the top of the first page. Also, the textual instruction was placed too close to the top of the screen, making it easier to be ignored.

*Student Sample*

This study employed a student sample, as do many Internet-related studies in Communications, Marketing, and Advertising (Cho & Khang, 2006). Although often criticized as convenience samples, there are several advantages of using college students as a study sample. First, college students are Internet savvy. Since this study examines different online sources, it is reasonable to employ a sample that is more technology-oriented than the general population.

Secondly, while one might argue that college students are generally in good health, research has shown that not all online health information seekers are patients. In fact, people who are family members/friends/significant others/caregivers of patients comprise a big part of online health information searchers (e.g., Ginossar, in press; Pew Internet & American Project, 2002b). They could be more active in seeking online health information than patients in some cases. For example, Ginossar found that family members who posted messages to online cancer groups were almost twice as likely as patients to seek information. College students certainly play all the above-mentioned roles; therefore, it is not invalid to employ them for this study.
Also, research has shown that healthy people usually start their searches on search engines, rather than on specialized health websites or portals, while the chronically ill tend to show loyalty to a specific website (Freeman, 2003). Since this study examines users’ perceptions of different online selecting sources, most of which are accessed through search engines, it is logical to use a sample consisting mainly of healthy people.

More importantly, research has shown that young people are increasingly turning to the Internet for health information. As mentioned in chapter 2, Kaiser Family Foundation (2001) reported, based on a nationally representative, random sample telephone survey of 1209 young people, that among the 90% of all 15-24 year-olds who have ever gone online, 75% have used the Internet at least once to find health information. Escoffery et al. (2005) found that more than half of the college students in the survey liked to find health information online, and almost one third indicated that they would like to participate in an online health campaign. While college students might not currently comprise the majority of online health information seekers, they could do so in the near future. Hesse et al. (2005) suggested that with the “graying of the baby boomers” (p. 2622), the trend of online health information search needs to be monitored in future studies. Studies on college students’ online health information consumption clearly lay a good foundation for future research.

**Sampling**

An external validity objection of this study is that the sample is from a relatively homogeneous community. Although subjects were recruited from two different disciplines at Penn State (Communication and Biobehavioral Health), the results might not hold for subjects from other majors at Penn State and those outside the university.
However, Morris, Woo and Cho (2003) pointed out that an accurate and exhaustive list of general Internet users is a prerequisite for a probability sample. Cho and Khang (2006) found that 76.1% of overall Internet–related research in Communications, Marketing, and Advertising used non-probability sampling methods. The fact that an exhaustive sampling list of all Internet users is not available remedies the sampling problem of this study.

*Ecological Validity*

It is to be noted that participants did not actually actively seek health information online. They were simply exposed to artificial screenshots that contained health messages and asked to read those messages. This might cause concern about this study’s ecological validity. However, it is necessary for the experimental design. Moreover, even if people do not actively seek health information online, they might encounter health information as they go about their daily routines online.

On the other hand, the ecological validity of this study was strengthened by simulating the experiment setting as approximate to the real-life situation that were being studied. The study was not conducted in a strictly controlled laboratory; rather, subjects were free to choose the time they wished to participate during the experiment period, and to log onto any computers as they would normally do in their daily routines to take part in the experiment. The often-criticized artificial setting of experimental research was thus reduced in this study.
Future research

Theoretically, it would be most interesting to use the new online source typology to study other emerging online sources, such as open sources (e.g., Wikipedia, RxWiki), online social networking sites (e.g., Facebook, Friendster, MySpace), or online rating systems (e.g., Amazon, Ebay, Epinions, Internet Movie Data Base). It would be equally rewarding to apply the typology in contexts other than health information, such as product information or do-it-yourself information, to examine online sources that particularly invite consumers’ action.

Secondly, in addition to perceived level of gatekeeping, who the actual gatekeeper is might influence users’ perceptions of information and behavioral intentions towards information. An experiment on the effect of search engine brand on evaluation of system performance showed that online searchers overwhelmingly favored Yahoo! and Google over MSN Live Search and a search engine created for the study (Jansen, Zhang, & Zhang, 2007), which suggests that how users perceive a certain gatekeeper of information is an important predictor of their perceptions of that information. Future research may look at the type or nature of gatekeeping that different selecting sources might be perceived to possess. For example, NIH website, CDC website, and WebMD might have different perspectives towards certain health issues. It is possible that users perceive these health websites in a diverse way. Also, will perceived trustworthiness of different health

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10 Wikipedia is a multilingual, web-based, free content encyclopedia project. Wikipedia is written collaboratively by volunteers; the vast majority of its articles can be edited by anyone with access to the Internet. Retrieved June 18, 2007, from http://en.wikipedia.org/wiki/Wikipedia:About
websites influence users’ perceptions of information and behavioral intentions towards information obtained from those websites?

The current study only measured mediators; it did not explore the causal influences of mediators. Future research may investigate the causation by manipulating mediators. For example, in order to determine whether perceived level of editorial gatekeeping causes different behavioral intentions towards information attributed to different sources, researchers may instruct one group of participants in the website condition “99% of the information on this website is monitored by editors,” while for the other group in the same website condition, the instruction may read: “Only 1% of the information on this website is monitored by editors.” If there is any difference of behavioral intentions between these two groups, then one can say for sure that perceived level of editorial gatekeeping causes behavioral intentions.

It would also be interesting to examine the effect of selecting source over the long run. Will a “sleeper effect” – a statistically significant increase in attitude change over time for a group exposed to a low-credibility source (Hovland & Weiss, 1951; Hovland et al., 1953) – occur in the relationship between selecting sources with different levels of gatekeeping and behavioral intentions? In other words, over time, will users forget from which selecting source the information is obtained? In this case, will a source with a lower level of gatekeeping (e.g., individual gatekeeping) have the same influence as a source with a higher level of gatekeeping on online information consumers’ behavioral intentions?

With the burgeoning of new media technologies, the continuous conflation of medium credibility and message credibility needs to be clarified in the communication
field. Also, future research could examine whether there is a positive relationship between medium credibility and information credibility, to further understand the relationships between different dimensions of credibility.

In terms of message selection, future research may choose two messages that are relatively equal in most characteristics, such as relevance and familiarity to respondents, to obtain a better understanding of the interaction between original source and selecting source.

Methodologically, a better manipulation of original source would mitigate the problem of the weak manipulation of original source in the current research. For example, a verbal instruction of the manipulation can be placed on the first page of the questionnaire, together with the textual instruction of the manipulation. Participants may be guided to listen to the audio file first before turn to the next page to answer questions.

Another way that might improve the original source manipulation is to include elements such as a picture of a doctor/layperson, or a profile of a doctor/layperson in the screenshots. The screenshots used in the current study only contained generic forms of the various selecting sources for the reason of minimizing noise. Future research may find ways to improve the design of the screenshots by including as many necessary ingredients as possible while still meeting experiment requirements.

The third strategy is to simply ask the original source manipulation question right after the dependent measure questions, without the interference of other questions in between. An alternative to this method is to constantly remind participants throughout the questionnaire which original source the information they receive is attributed to; in fact,
the current study constantly reminded participants of the selecting source, and this is probably one of the reasons why the selecting source manipulation was strong.

Another future research idea is to discard the visualized screenshots, replacing them with textual instructions, such as “You received an e-mail from a friend about a message that your friend picked up from a website/bulletin board/blog/homepage/the Internet. The message was authored by a medical doctor/layperson.” These manipulations are more simple and parsimonious than those of the current study; yet they serve the same purpose of the study.\textsuperscript{12}

This dissertation research can also benefit from future studies which employ procedures that resemble real-world conditions, such as an active online health information seeking task. Research has shown that people using search engines were more focused on getting the information fast than in finding a trusted name (Pew Internet & American Life Project, 2002a). Under the time pressure, will people still notice different sources?

Studies using non-student samples and probability sampling will contribute to the understanding of the influence of online sources on users’ perceived credibility of information and behavioral intentions towards information as well.

\textbf{Conclusion}

Although empirical evidence showed that Internet-based communication may result in positive outcomes across a wide range of health behaviors, there is little known about which features affected the outcomes (Neuhauser & Kreps, 2003). In fact, Rains (2006) stated that one challenge to online health communication scholars is to understand

\textsuperscript{12} This future research idea was in fact the initial idea of the current research. The researcher worried that participants of this study might not be familiar with some of the selecting sources, such as blogs. Therefore, the researcher decided to use screenshots to visualize different selecting sources.
the effects of specific features of health sites on information seekers’ perceptions, attitudes, and behavior. To this end, this dissertation research examined influences of online health communication sources (original source and selecting source) on users’ perceived credibility of information and behavioral intentions towards information. This study suggested that users’ behavioral intentions vary as a function of the type of selecting source, i.e., whether the information is sourced from a website, a bulletin board, a blog, a homepage, or the Internet in general. The effect was mediated by perceived level of gatekeeping and perceived information completeness. The research also indicated that different combinations of original source and selecting source result in different perceived credibility of information, mediated by perceived appropriateness of source placement, although the interactions between sources differs as a function of message. The study developed a new online source typology with a view to guide future research on online sources and to be applied in areas other than health information.
References


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Sundar and Nass’s Source Typology

Communication Sources

Visible  Technological  Receiver

Audience   Self

---

Figure 2-2

Online Health Information Source Typology (Part)

Communication Sources

Visible
Website → Homepage → Blog

Receiver
Bulletin Board

Technological
Internet
Online Health Information Source Typology (Full)

Communication Sources

Visible
- Website
- Homepage
- Blog

Receiver
- Bulletin Board

Technological
- Internet

Prof\textsuperscript{14} Lay\textsuperscript{15}
Prof Lay
Prof Lay
Prof Lay
Prof Lay

\textsuperscript{14} Professional Source
\textsuperscript{15} Layperson Source
Hypothesized Mediators of the Relationship between Selecting Source and Psychological Outcomes\textsuperscript{16}

H1a-c Perceived Gatekeeping

H1d Perceived Information Completeness

H1e

H1a-c Psychological Outcomes

H1f Perceived Bandwagon

\textsuperscript{16} Psychological outcomes refer to the two dependent variables in this study: perceived credibility of information and behavioral intentions towards information.
Figure 2-5

Hypothesized Mediators of the Relationship between Original Source and Psychological Outcomes
Hypothesized Mediator of the Relationship between Source Combination and Psychological Outcomes
Mean Credibility Score as a Function of Original Source and Selecting Source

Figure 5-1

Mean Credibility Score as a Function of Original Source and Selecting Source

1=Website  2=Bulletin Board  3=Blog  4=Homepage  5=Internet
Mean Milk Message Credibility Score as a Function of Original Source and Selecting Source

1=Website  2=Bulletin Board  3=Blog  4=Homepage  5=Internet
Figure 5-3

Mean Sunscreen Message Credibility Score as a Function of Original Source and Selecting Source

1=Website  2=Bulletin Board  3=Blog  4=Homepage  5=Internet
Mean Behavioral Intentions Score as a Function of Selecting Source

1=Website  2=Bulletin Board  3=Blog  4=Homepage  5=Internet
Figure 5-5

Supported Mediators of the Relationship between Selecting Source and Behavioral Intentions
Figure 5-6

Supported Mediator of the Relationship between Source Combination and Perceived Information Credibility
Mean Behavioral Intentions Score as a Function of Original Source and Selecting Source Based on Manipulation Check Successful Dataset

1=Website  2=Bulletin Board  3=Blog  4=Homepage  5=Internet
Figure 5-8

Mean Credibility Score as a Function of Perceived Original Source

1=Doctor       2=Layperson
Mean Behavioral Intentions Score as a Function of Perceived Original Source

1=Doctor  
2=Layperson
Figure 5-10

Mean Behavioral Intentions Score as a Function of Perceived Original Source and Perceived Selecting Source

1=Website 2=Bulletin Board 3=Blog 4=Homepage 5=Internet
Figure 6-1

Mean Behavioral Intentions Score as a Function of Reduced Selecting Source

1 = Website + Bulletin Board  
2 = Blog + Homepage  
3 = Internet
New Online Source Typology

Communication Sources

Collective Gatekeeping  Individual Gatekeeping  Unknown Gatekeeping

Website  Bulletin Board  Blog  Homepage  Internet
Table 3-1

Message Controversy

<table>
<thead>
<tr>
<th>Message</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>103</td>
<td>11.04</td>
<td>3.99</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>103</td>
<td>12.13</td>
<td>4.79</td>
</tr>
<tr>
<td>Sunscreen &amp; Vitamin D</td>
<td>103</td>
<td>16.62</td>
<td>4.32</td>
</tr>
<tr>
<td>Colds</td>
<td>51</td>
<td>8.09</td>
<td>3.76</td>
</tr>
<tr>
<td>Microwaves &amp; Plastic Containers</td>
<td>51</td>
<td>10.00</td>
<td>4.35</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>51</td>
<td>12.29</td>
<td>4.89</td>
</tr>
<tr>
<td>Eating &amp; Exercise</td>
<td>55</td>
<td>10.56</td>
<td>3.77</td>
</tr>
<tr>
<td>Raw Milk</td>
<td>55</td>
<td>13.05</td>
<td>4.42</td>
</tr>
<tr>
<td>Energy Drinks</td>
<td>55</td>
<td>11.76</td>
<td>3.97</td>
</tr>
</tbody>
</table>
Table 3-2

Selecting Source Typicality

<table>
<thead>
<tr>
<th>Selecting Source</th>
<th>$N$</th>
<th>Mean</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website</td>
<td>16</td>
<td>7.12</td>
<td>1.5</td>
</tr>
<tr>
<td>Homepage</td>
<td>16</td>
<td>7.38</td>
<td>1.99</td>
</tr>
<tr>
<td>Bulletin Board</td>
<td>16</td>
<td>7.81</td>
<td>1.60</td>
</tr>
<tr>
<td>Blog</td>
<td>16</td>
<td>7.06</td>
<td>2.29</td>
</tr>
</tbody>
</table>
Table 4-1

Experimental Treatment Conditions

<table>
<thead>
<tr>
<th></th>
<th>Website</th>
<th>Homepage</th>
<th>Bulletin Board</th>
<th>Blog</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sunscreen</strong></td>
<td>Doctor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Layperson</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Milk</strong></td>
<td>Doctor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Layperson</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 5-1

Manipulation Checks

Original Source Manipulation Check

<table>
<thead>
<tr>
<th>Original Source</th>
<th>N</th>
<th>Respondents Perceived As…</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Doctor</td>
</tr>
<tr>
<td>Doctor</td>
<td>280</td>
<td>33%</td>
</tr>
<tr>
<td>Layperson</td>
<td>265</td>
<td>3%</td>
</tr>
</tbody>
</table>

Selecting Source Manipulation Check

<table>
<thead>
<tr>
<th>Selecting Source</th>
<th>N</th>
<th>Respondents Perceived As…</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Website</td>
</tr>
<tr>
<td>Website</td>
<td>107</td>
<td>80%</td>
</tr>
<tr>
<td>Bulletin Board</td>
<td>117</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Blog</td>
<td>110</td>
<td>0%</td>
</tr>
<tr>
<td>Homepage</td>
<td>101</td>
<td>0%</td>
</tr>
<tr>
<td>Internet</td>
<td>117</td>
<td>7%</td>
</tr>
</tbody>
</table>

Note: Percentages may not equal to 100 due to rounding.
Table 5-2

Mean Credibility Score as a Function of Original Source and Selecting Source

<table>
<thead>
<tr>
<th>Selecting Source</th>
<th>Website</th>
<th>Bulletin Board</th>
<th>Blog</th>
<th>Homepage</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>4.10_{aA}</td>
<td>3.73_{aAbB}</td>
<td>3.38_{aAbB}</td>
<td>2.99_{bB}</td>
<td>3.22_{bB}</td>
</tr>
<tr>
<td>SE</td>
<td>.28</td>
<td>.28</td>
<td>.28</td>
<td>.30</td>
<td>.30</td>
</tr>
<tr>
<td>Layperson</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>3.08_{bB}</td>
<td>3.72_{aAbB}</td>
<td>3.46_{aAbB}</td>
<td>3.56_{aAbB}</td>
<td>3.37_{aAbB}</td>
</tr>
<tr>
<td>SE</td>
<td>.29</td>
<td>.29</td>
<td>.31</td>
<td>.31</td>
<td>.32</td>
</tr>
</tbody>
</table>

\(F(4, 513) = 2.30, p = .05.\)

**Note:** Using Student’s t post hoc comparisons, within rows, means with no lower case subscript in common differ at \(p < .05\); within columns, means with no upper case subscript in common differ at \(p < .05\).
Table 5-3
Mean Credibility Score as a Function of Message, Original Source and Selecting Source

<table>
<thead>
<tr>
<th>Selecting Source</th>
<th>Website</th>
<th>Bulletin Board</th>
<th>Blog</th>
<th>Homepage</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>4.21_{ab}</td>
<td>3.8_{bcd}</td>
<td>3.73_{abcd}</td>
<td>2.63_{d}</td>
<td>3.55_{abcd}</td>
</tr>
<tr>
<td>SE</td>
<td>.40</td>
<td>.37</td>
<td>.38</td>
<td>.44</td>
<td>.37</td>
</tr>
<tr>
<td>Layperson</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>3.35_{bcd}</td>
<td>3.87_{abc}</td>
<td>3.29_{bcd}</td>
<td>4.48_{a}</td>
<td>3.38_{abcd}</td>
</tr>
<tr>
<td>SE</td>
<td>.41</td>
<td>.38</td>
<td>.41</td>
<td>.41</td>
<td>.42</td>
</tr>
<tr>
<td>Sunscreen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>3.99_{abc}</td>
<td>4.08_{ab}</td>
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<td>.37</td>
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</tr>
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<td>.40</td>
<td>.41</td>
<td>.42</td>
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</table>

F(4, 513) = 3.48, p < .01.

Note: Using Student’s t post hoc comparisons, means with no subscript in common differ at p < .05.
Table 5-4

Mean Behavioral Intentions Score as a Function of Selecting Source

<table>
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<tr>
<th>Selecting Source</th>
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<th>Bulletin Board</th>
<th>Blog</th>
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<td>.14</td>
<td>.16</td>
<td>.16</td>
<td>.17</td>
</tr>
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</table>

\[ F(4, 512) = 3.27, p = .01. \]

**Note:** Using Student’s t post hoc comparisons, means with no subscript in common differ at \( p < .05. \)
Table 5-5

Mean Behavioral Intentions Score as a Function of Original Source and Selecting Source

Based on Manipulation Check Successful Dataset

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<th>Selecting Source</th>
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<td>.20_{bBcC}</td>
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_F(4, 513) = 2.30, p = .05._

**Note:** Using Student’s t post hoc comparisons, within rows, means with no lower case subscript in common differ at _p_ < .05; within columns, means with no upper case subscript in common differ at _p_ < .05.
Table 5-6

Mean Behavioral Intentions Score as a Function of Perceived Original Source and Perceived Selecting Source

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<th>Blog</th>
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<td></td>
<td>SE .17</td>
<td>.15</td>
<td>.12</td>
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<td>.18</td>
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</table>

\[F(4, 514) = 2.33, p = .05.\]

**Note:** Using Student’s t post hoc comparisons, within rows, means with no lower case subscript in common differ at \( p < .05 \); within columns, means with no upper case subscript in common differ at \( p < .05 \).
Table 6-1

Mean Behavioral Intentions Score as a Function of Reduced Selecting Source

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<th>Blog + Homepage</th>
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<td>1.60&lt;sup&gt;B&lt;/sup&gt;</td>
</tr>
<tr>
<td>SE</td>
<td>.11</td>
<td>.12</td>
<td>.17</td>
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</tbody>
</table>

\[ F(2, 520) = 5.46, p < .01. \]

*Note:* Using Student’s t post hoc comparisons, means with no subscript in common differ at \( p < .05 \).
Appendix A

Health Messages

Carbohydrates

Many fad diets claim that carbohydrates are terrible, and they blame grains for everything from arthritis to obesity. However, they overlook the fact that carbohydrates can actually be very good for you, especially if you have an active and energetic lifestyle. Carbohydrates provide the fuel necessary for peak performance and are the preferred source of energy for physical activities. For example, athletes need more grains. It has been known that a high carb diet can enhance endurance during strenuous athletic events, while the performance is reduced on a low-carb diet.

Antibiotics

Many people believe that antibiotics can help cure colds. This is totally wrong. Antibiotics only work against illnesses caused by bacteria and colds are caused by viruses. Not only do antibiotics do no good to curing colds, but they can actually do harm to your body by causing allergic reactions that may be fatal. Further, using antibiotics when they are not necessary has led to the growth of several strains of common bacteria that are resistant to antibiotics.

Therefore, it is important to limit the use of antibiotics to situations in which they are necessary, such as a rare bacterial complication (sinusitis, ear infections, etc). In addition, you should not use antibiotics “just in case” because they will not prevent bacterial infections. If you get a cold, the best cure is to rest in bed and drink plenty of fluids instead of taking antibiotics.
Sunscreen & Vitamin D

Exposure to sunlight provides you with your vitamin D requirement. Using sunscreen all the time might deprive you of much needed vitamin D. In fact, sunscreen is one of the LAST things you want to put on your body.

Sunscreen does not stop skin cancer. It is a toxic chemical that can cause problems in your system and increase your risk of disease. Even weak sunscreens (SPF=8) block your body's ability to generate vitamin D by 95%. Sunscreen products actually cause disease by creating a critical vitamin D deficiency in the body. Osteoporosis is commonly caused by a lack of vitamin D, which greatly impairs calcium absorption. Sufficient vitamin D prevents prostate cancer, breast cancer, ovarian cancer, depression, colon cancer and schizophrenia.

A far more logical solution would be to creatively use your clothing to block the sun’s rays. Additionally, consuming many whole vegetables will increase antioxidant levels in the body, which will provide protection against any sun-induced radiation damage.

Colds

Some people believe that if they go outside with wet hair they will develop a cold. They also believe that they will get a cold from exposure to cold weather. But wet hair does not cause a cold. Neither will cold weather. The reason that there appears to be a relationship is that you spend more time indoors during the cold winter weather. In fact, however, it is the proximity to other people rather than the temperature outside that seems to be the culprit. For this same reason, children in daycare or kindergarten are particularly
prone to having colds. Cold can be caused by viruses. The best way to prevent a cold's transmission is to wash your hands frequently with soap and warm water.

**Microwaves & Plastic Containers**

You might have heard the following suggestions: do not heat your food in the microwave using plastic containers because the combination of fat, high heat and plastics releases dioxin into the food and ultimately into the cells of the body. However, there is little truth to this claim.

The level of Dioxin in food-grade plastics is way too low to cause any effect. In fact, Brussel Sprouts and Ben & Jerry's ice cream contain the same chemical. Moreover, our body itself can make a few chemicals that can activate the same target protein in our liver cells that is activated by Dioxin and it might have some role in controlling inflammation! It appears that low levels of Dioxin can be beneficial and high doses can be detrimental. So you do not have to worry about using plastic containers in the microwave.

**Saturated Fat**

Contrary to what you hear on the news, it is not the saturated fat in the foods we eat that is causing all of this heart disease. Rather, it is the excess carbohydrates from our starch and sugar-laden diet that is making people fat and unhealthy, leading to epidemic levels of a host of diseases such as diabetes and later, heart disease.

In fact, your body cannot function properly without adequate amounts of fat – it influences everything from blood clotting to vitamin absorption and brain function. As such, there are many dangers associated with a low-fat diet. It can raise bad cholesterol, increase risk of injury and stroke, worsen heartburn, and deny children essential nutrients.
Also, many people have adopted low-fat diets as a way to lower their cholesterol.
Not only are low-fat diets not the key to lowering cholesterol (as mentioned above they may actually raise bad cholesterol), but low cholesterol does not necessarily imply good health. For instance, low cholesterol is linked to many problems including aggressive behavior, depression, suicide and stroke.

**Eating & Exercise**

Some people believe that eating before exercise can slow you down. For example, they caution you against going swimming for at least one hour after eating a large meal because they claim that you will feel sluggish or have an upset stomach, cramping and diarrhea. However, there is little truth to this claim. In fact, not eating before you exercise can be harmful. Low blood sugar levels (that result from not eating) can make you feel weak, faint or tired, and your mental abilities may be affected as well, making you slower to react.

**Raw Milk**

Is milk good for you? Yes, but only raw milk. Pasteurized milk is not a health food and should be avoided. It is primarily the pasteurization process, combined with the source of largely unhealthy cows that is the problem.

When milk is pasteurized, the structure of the milk proteins changes into something far less healthy. Not only does pasteurization destroy the major proportion of vitamins, enzymes and minerals, it creates contaminants. Pasteurized milk cannot maintain biological antibodies, some of which can prevent a large variety of diseases, including cancer. In fact, calves fed pasteurized milk die before maturity.
Clean raw milk from certified healthy cows, instead, is available commercially in several states and may be bought directly from the farm in many more. Start to drink raw milk!

**Energy Drinks**

Some people have bought into the idea that energy drinks can enhance their performance in sports and increase concentration in school. However, the drinks, laden with caffeine and sugar, can hook people on an unhealthy jolt-and-crash cycle.

Although served in cans two-thirds the size of a standard can of Coke, energy drinks contain two to four times the amount of caffeine as that of Coke. And now energy drinks are moving toward bigger cans with some products raising the caffeine content to gain a competitive edge. In addition, some energy drinks have B vitamins, which when taken in megadoses can cause rapid heartbeat, and numbness and tingling in the hands and feet.

The biggest worry is how some people use the drinks. Some report downing several cans in a row to get a buzz. In fact, there are a surprising number of poison-center calls from young people getting sick from too much caffeine. Think twice before you purchase or consume an energy drink!
Appendix B

Screenshots

Message: Sunscreen

Original Source: Doctor

Selecting Source: Website

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Sunsreen Products Cause Disease

Chris Parker, M.D.

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"eHealthy News You Can Use"

Thursday, February 8, 2007

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Updated: 02-08-2007
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Chris Parker, M.D.

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Message: Sunscreen

Original Source: Layperson

Selecting Source: Bulletin Board

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Chris Parker

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Updated: 02-08-2007
### Today's News

Pasteurized Milk Is Not Healthy

**Chris Parker**

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Message: Milk

Original Source: Layperson

Selecting Source: Bulletin Board

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Is milk good for you? Yes, but only raw milk. Pasteurized milk is not a health food and should be avoided. It is primarily the pasteurization process, combined with the source of largely unhealthy cows that is the problem.

When milk is pasteurized, the structure of the milk proteins changes into something far less healthy. Not only does pasteurization destroy the major proportion of vitamins, enzymes and minerals, it creates contaminants. Pasteurized milk cannot maintain biological antibodies, some of which can prevent a large variety of diseases, including cancer. In fact, calves fed pasteurized milk die before maturity.

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VITA

YIFENG HU

EDUCATION

- Ph.D. in Mass Communications, Pennsylvania State University, 2007
- M.Phil. in Communication, Chinese University of Hong Kong, 2002
- B.A. in Journalism, Renmin University of China, 2000

TEACHING EXPERIENCE

- Instructor, Pennsylvania State University, 2005 - 2006
- Teaching Assistant, Pennsylvania State University, 2004 - 2005
- Teaching Assistant, Chinese University of Hong Kong, 2001 - 2002

SELECTED PUBLICATIONS


SELECTED PROFESSIONAL SERVICE

- Membership Chair, Communication Technology & Policy Division (CTP), Association for Education in Journalism and Mass Communication (AEJMC), 2003 - 2005.

SELECTED AWARDS

- Top Three Student Paper Award, CTP, AEJMC, Kansas City, MO, July 2003.
- Graduate Exhibition Award, Pennsylvania State University, March 2003.