



Health information-seeking and perceptions of website credibility: Examining Web-use orientation, message characteristics, and structural features of websites

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ABSTRACT

The study reported here examined perceptions of health website credibility during the process of acquiring health information using the World Wide Web. The relationships between perceptions of website credibility and both message characteristics (e.g., statistics, testimonials) and structural features of health websites (e.g., privacy policy statement, third-party endorsements) were assessed. Additionally, one's Web-use orientation (i.e., searching or surfing) was evaluated as a moderator of the preceding relationships. The results showed a positive relationship between the presence of structural features and perceptions of website credibility as well as a positive relationship between the presence of message characteristics and attitudes about the health topic. Although Web-use orientation moderated the relationship between message characteristics and perceptions of website credibility, the nature of this relationship was inconsistent with study predictions.

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1. Introduction

The rapid growth in use of the Internet and World Wide Web for acquiring health information has received a great deal of attention in recent years. In that time, the Web has been variously described as a harbinger of empowerment (Anderson, Rainey, & Eysenbach, 2003; Kivits, 2004) and as a threat to the wellbeing of patients (Broom, 2005; Finn & Banach, 2000; Roberts & Copeland, 2001). A theme running throughout the debate concerning the merits of health information on the Web is the notion that those venturing online ought to be critical information seekers and consumers (Cline & Haynes, 2001; Eysenbach, Powell, Kuss, & Sa, 2002; Winker et al., 2000). Evaluating the credibility of a website is critical for information seekers—especially in light of the increased prevalence of user-generated content that partially defines “Web 2.0” (Flanagin & Metzger, 2008). Website credibility is one factor that consumers use to make judgments about the

quality and utility of information posted on a site (Kivits, 2004; Sillence, Briggs, Harris, & Fishwick, 2007). As such, website credibility has the potential to influence consumer decision-making and health behaviors (Dutta-Bergman, 2003a; Eysenbach, 2008; Hong, 2006; Rains, 2007).

Although credibility has been studied since the days of Aristotle, wide-spread diffusion of the Internet has raised new questions about this topic among contemporary scholars (Fogg, 2003; Metzger & Flanagin, 2008; Metzger, Flanagin, Eyal, Lemus, & McCann, 2003). Recent studies have examined the role of various structural features of websites and characteristics of messages in predicting perceptions of website credibility (Burkell, 2004; Flanagin & Metzger, 2000; Fogg, 2003; Fogg et al., 2001; Hong, 2006; Nettleton, Burrows, & O'Malley, 2004). Message characteristics include elements of the arguments and information posted on a webpage (e.g., statistics, testimonials, external references), while structural features of a website consists of the stable components of a site that are distinct from the informational content (e.g., third-party endorsements, privacy policy statement). Yet, the situated and dynamic nature of website credibility perceptions warrants further consideration—particularly in the context of health websites. Information seekers using the Internet are simultaneously exposed to multiple message characteristics and structural features. Further, consumers play an active role in the information-seeking process, determining the types and amount of information to which they are exposed. These two issues likely have important implications for perceptions of health website credibility, but have been largely overlooked in research

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conducted to date (for exceptions, see Dutta-Bergman, 2003b, 2004; Hong, 2006).¹

The study reported here attempted to achieve two goals. First, the relationships between perceptions of website credibility and both the structural features of health websites and message characteristics were simultaneously examined. As opposed to studying one or two message characteristics or structural features in isolation, six message characteristics and seven structural features were assessed concurrently. Second, we used the elaboration likelihood model (ELM) (Petty & Cacioppo, 1986) and heuristic systematic model (HSM) (Chaiken, 1987) from the literature on social influence and persuasion to examine the impact of one's Web-use orientation (i.e., searching or surfing) on perceptions of website credibility. Web-use orientation consists of one's approach to navigating the Web and has consequences for how one evaluates websites (Dutta-Bergman, 2004). Web searching was conceptualized as fostering central processing in the ELM and HSM, and surfing was conceptualized as encouraging peripheral processing. Web-use orientation was proposed to moderate the influence of message characteristics and structural features of websites on credibility perceptions. In the following section, research on source credibility and the Web will be reviewed to develop study hypotheses and research questions.

2. Website credibility and health information on the web

2.1. Credibility and the World Wide Web

Credibility is defined as “judgments made by a perceiver concerning the believability of a communicator” (O’Keefe, 2002, p. 181). The study of credibility has a long history in the academy. From Aristotle (1960) to Hovland and his colleagues (1953), credibility has been examined as a factor influencing message receivers’ perceptions, attitudes, and behaviors. Yet, the development and diffusion of new information and communication technologies like the Internet and Web has reinvigorated interest in this relatively old construct (Fogg, 2003). A key issue in contemporary research on credibility in the context of new communication technologies like the Web is the increased responsibility placed on individuals to evaluate the quality of information sources. Indeed, Metzger et al. (2003) note that:

The filters and control mechanisms, which formally served to validate and endorse a rather limited number of information outlets, may not be as effective in this new media environment. Absent such controls, information assessment and verification—core components of... credibility—now often become the responsibility of the media consumer. (p. 294)

To understand fully the implications of the Web for research on credibility, one must consider the characteristics that distinguish the Web from other types of communication media. First, the Web lacks the professional gatekeepers that help define traditional media like newspapers and television (Cline & Haynes, 2001). Indeed, increased participation of individual Web users in contributing content is a defining characteristic of “Web 2.0” (O’Reilly, 2005). Anyone with access to the Internet can potentially contribute medical information on wikis, blogs, or message boards. Addi-

tionally, the Web is marked by the blending of advertising and informational content (Metzger et al., 2003). Some pharmaceutical websites, for example, offer extensive medical information and simultaneously make consumers aware of their products. A related issue is that the markers available in traditional media that may function as cues to a source’s credibility are not as readily available or are altogether missing on the Web (Johnson & Kaye, 2000). Granted the sheer number of websites that ostensibly serve the same purpose (e.g., cancer.org, cancerpage.com, cancerindex.org), cues such as the name of a particular website may not be as meaningful of an indicator of credibility as the name of a newspaper or television network. Finally, the notion of what it means to be a “source” is distinct from other contexts (Sundar, 1998; Sundar & Nass, 2001). Sundar and Nass found that receivers make different attributions about the source of information on the Web, and these attributions influence their perceptions of messages.

Given these unique characteristics distinguishing the Internet and Web from other media, conceptualizations of credibility have been tailored to this context (Eastin, 2001; Fogg, 2003; Johnson & Kaye, 1998, 2000; Metzger et al., 2003; Walther, Wang, & Loh, 2004). Further, scholars have begun to examine various types of credibility relevant to this context, including the credibility of the website as a whole, the credibility of the website sponsor, and message credibility (Metzger & Flanagin, 2008). The study reported here focused on website credibility, which is conceptualized as a multi-dimensional construct involving the perceived expertise and trustworthiness of a particular health website. Expertise consists of the qualifications of a website, while trustworthiness is the degree to which a site is truthful and unbiased.

2.2. Web-use orientation and perceptions of website credibility

In examining website credibility, it is important to consider the information-seeking context in which individuals encounter health websites. As opposed to viewing a single website in a vacuum, information seekers bring various motivations that may influence the processes and outcomes of their information-acquisition endeavors (Fox & Rainie, 2002; Howard & Massanari, 2007; Nettleton, Burrows, & O’Malley, 2005). One key factor is the individual’s general orientation toward using the Web. Dutta-Bergman (2003b, 2004) argues that health information-acquisition using the Internet can be understood by applying dual-process models of message processing like the ELM (Petty & Cacioppo, 1986) and HSM (Chaiken, 1987). The ELM and HSM are widely used and cited approaches for understanding message processing and persuasion (Booth-Butterfield & Welbourne, 2002; Chen & Chaiken, 1999) and, as such, offer a solid theoretical foundation from which to examine issues related to credibility and persuasion in the context of new communication technologies. Both models attempt to explain receivers’ cognitive and attitudinal responses to messages.² Two mechanisms are central to the ELM and HSM: central and peripheral processing. In processing messages through the central route, message receivers scrutinize and are influenced by the argument(s) contained in the message. Peripheral processing involves focusing on heuristic cues external to the specific arguments contained in the message, such as the total number of arguments presented or attractiveness of a source. Heuristic cues are what determine one’s response to the message.

Dutta-Bergman (2003b, 2004) contends that searching for information involves central processing and surfing involves peripheral

¹ That is, a noteworthy amount of experimental research has been conducted manipulating various individual components of websites such as the presence of a privacy policy statement or privacy seal (Metzger, 2006, 2007; Rifon, LaRose, & Choi, 2005), third-party endorsement (Hu, Lin, & Zhang, 2002; Wang, 2005), or the presence of a physical address (Freeman & Spyridakis, 2004) and examining participants’ perceptions of website credibility. However, fewer experimental studies have been conducted that examine the role of the information-seeking process in the development of credibility perceptions (for exceptions, see Dutta-Bergman, 2003b, 2004; Hong, 2006).

² Although the ELM and HSM are distinct models that make unique predictions about message processing, there is some overlap in their conceptualization of central and peripheral processing. We focus on the overlap in central and peripheral processing in applying the ideas in the ELM and HSM to surfing and searching behaviors.

processing. Searching for information is a focused and goal-directed activity. Searching “generates the audience member’s involvement in a particular issue by orienting him or her toward the specific information need that is driving the search” (Dutta-Bergman, 2004, p. 255). Thus, individuals who are searching are more likely to closely evaluate the arguments presented on health websites. Surfing, in contrast, is unplanned and exploratory. Surfers are “experientially oriented and are drawn to whatever is interesting in their information environment” (Dutta-Bergman, 2004, p. 255). Accordingly, those who are surfing are not as inclined to evaluate a Website as closely as searchers.³ It is noteworthy that searching and surfing represent general orientations toward Web navigation and should be considered as distinct from the specific motivations for Web-use represented in theories such as uses and gratifications (Blumler & Katz, 1974) and recent models of health information-seeking (Josefsson, 2006). Searching and surfing reflect the degree to which individuals engage in goal-directed activity and, thus, are likely to scrutinize the health websites they encounter.

The application of dual-process theories to research on website credibility has two important implications.⁴ First, the ELM and HSM suggest specific factors associated with health websites that should influence credibility perceptions. The characteristics of messages presented on the website and the structural features associated with the health site are likely to shape perceptions of the website’s credibility. Second, the two orientations toward Web-use derived from the ELM and HSM should have a systematic influence on determining when message and structural features are more or less important. Searching and surfing may make message or structural features more or less likely to influence credibility perceptions. These two implications will be addressed to develop study hypotheses and research questions.

Message content plays a central role in both the ELM and HSM and may also shape perceptions of a website’s credibility. The primary arguments and information posted on a health website provide a substantial amount of evidence that information seekers use to evaluate the credibility of the site (Dutta-Bergman, 2004; Hong, 2006; Metzger et al., 2003). Previous research has examined whether or not the message included characteristics such as quotes, testimonials, statistics, and references (Hong, 2006). Such features are argued to function as indicators of the quality of the information presented on a website. Particularly in the context of a health website, these components demonstrate that information from outside sources is being integrated into the message on the site. Hong (2006) found that the presence of message characteristics, such as statistics and references, was positively associated with perceptions of website credibility.

As indicated by the ELM and HSM, peripheral or heuristic cues may also influence credibility perceptions. Structural features of websites may function as such cues and provide information about the quality of the site. Structural features of websites are distinct from the message content and include the relatively stable attributes of a site. The name of the organization operating or sponsoring the website, images, third-party endorsements (e.g., a “Health on the Net” seal), a physical address or telephone number, privacy policy statement, links to external websites, and navigation menu are all structural features of a website. Especially in a health context, where much of the information may be technical in nature

or directed at health care practitioners, these cues may shape information seekers’ judgments of website quality. These cues can function to indicate that a site is reputable.

Researchers have examined the influence of structural features such as a privacy policy statement or privacy seal (Metzger, 2006, 2007; Rifon et al., 2005), third-party endorsements (Hu et al., 2002; Wang, 2005), and the presence of a physical address (Freeman & Spyridakis, 2004) on perceptions of and responses to websites. LaRose and Rifon (2007), for example, found that participants in their study were significantly more likely to report intentions to disclose personal information on a website containing a privacy seal than a site lacking a seal. Kim, Ferrin, and Rao (2008) reported that the presence of a third-party endorsement was negatively associated with participants’ perceptions of the risk associated with purchasing a product from a website. Freeman and Spyridakis (2004) manipulated the presence or absence of the physical address and phone number for the organization sponsoring a health website. They found that participants rated the website to be significantly more credible when the address and phone number were present. Although many of these studies were not conducted in the domain of health, it seems possible that the structural features of websites could serve as a heuristic cue and influence perceptions of health websites. Structural characteristics such as third-party endorsements can provide evidence that a site is trustworthy or can be held accountable and, thus, may improve perceptions of the websites’ credibility (Hong, 2006).

2.3. Hypotheses and research question

The ELM (Petty & Cacioppo, 1986) and HSM (Chaiken, 1987) suggest that the presence of key message characteristics and structural features should influence perceptions of a website’s credibility. Although various individual structural features and message characteristics have been examined in previous research, many of the studies focused on manipulating and assessing the influence of one or two distinct factors (e.g., Freeman & Spyridakis, 2004; Walther et al., 2004). As such, little is known about the aggregate impact of message and structural features and the role of the search process has been largely overlooked. In this research, we sought to capture the dynamic nature of the information-seeking process. Participants in this study engaged in a health information-acquisition task using the Web and evaluated the credibility of health websites they viewed. This approach made it possible to examine the concomitant influence of various structural features and message characteristics on credibility perceptions.

In this study we examined the presence of six key message characteristics that have been linked with perceptions of website credibility in previous research (Hong, 2006), including: statistical information (e.g., percentages, ratios), testimonials, quotations, references (i.e., the citation of an external source for information), identification of a message author, and an indicator of message currency. We also examined the presence of seven key structural features that are distinct from the primary message content on a webpage and have been identified in previous research as factors that may be associated with perceptions of website credibility (Fogg et al., 2001, 2003; Hong, 2006). The seven structural features include: third-party endorsements, images, a physical address or telephone number, a privacy policy statement, a navigation menu, the name of the person or organization operating the website, and link(s) to external websites. We predicted that the presence of these key message characteristics and structural features would function to reinforce the expertise and trustworthiness of a particular health website and, thus, be positively associated with credibility perceptions. Additionally, beyond shaping credibility perceptions, it is plausible that the influence of message features and structural characteristics may extend to attitudes about the

³ Although, as specified in the HSM, it is possible to focus on both central and peripheral cues simultaneously, the approach advocated here is that those individuals who are searching (and engaging in central processing) are more inclined to focus on message content than cues external to the message. Similarly, those who are surfing are more inclined to engage in cues external to the message.

⁴ Although credibility is often examined as an independent variable in research involving the models of message processing like the ELM (Stiff & Mongeau, 2003), it is treated as a dependent variable in this study—consistent with other works focusing on website credibility (Dutta-Bergman, 2004; Metzger & Flanagin, 2007).

health topic. In fostering positive perceptions about a particular health website, the presence of key structural site features and message characteristics may lead to more positive attitudes about the broader health topic to which the website is dedicated. The following hypotheses were proposed:

- H1: The presence of the six key message characteristics is positively correlated with (a) perceptions of website credibility and (b) attitude toward the health topic.
- H2: The presence of the seven structural features is positively correlated with (a) perceptions of website credibility and (b) attitude toward the health topic.

The relative importance of the preceding factors in shaping credibility perceptions and attitudes is likely moderated by one's Web-use orientation. Searching for health information should foster central processing described in the ELM/HSM and encourage individuals to scrutinize the messages contained on health websites. Individuals should be sufficiently motivated, and presumably able, to closely evaluate the message on the website to learn about the health topic. As such, message-relevant factors may be particularly influential in shaping credibility perceptions. The six message characteristics should better predict perceptions of website credibility and attitudes about the health topic when individuals are searching than when surfing. Further, the relationship between the presence of the six characteristics and both credibility and attitudes should be positive. In contrast, the seven structural features of websites should be especially important when individuals are surfing. Given that surfing fosters peripheral processing (Dutta-Bergman, 2003b, 2004), structural features of a website may function as heuristic cues. Those who are surfing lack the motivation to closely evaluate the information on the websites. Accordingly, features external to the message like the inclusion of a privacy policy or the street address of the organization operating a website may be used as indicators that a website is credible. In turn, the positive perceptions of the health website generated by the presence of these cues may extend to one's attitude about the health topic. The relationship between the presence of the seven structural features and both credibility perceptions and attitudes should be positive.

The following hypotheses and research question are posed to examine the role of one's orientation toward Web-use on credibility perceptions and attitudes about the health website. First, it is unclear how one's orientation toward using the Web influences perceptions of site credibility and attitudes about a health topic. Those who are engaged in searching may feel more invested in the topic and websites they view than those who are surfing and subsequently deem the sites to be of higher quality; yet, it also seems possible that those who are searching and scrutinizing the content of the websites may view the sites more critically and rate them as being of lower quality. Accordingly, we pose a research question to explore this issue. Second, as previously discussed, we predicted that an interaction exists between one's orientation toward using the Web (searching vs. browsing) and site attributes (site features vs. message characteristics) on perceptions of website credibility and attitudes toward the health topic. One's Web-use orientation is likely to make particular attributes more or less salient and influence credibility perceptions and attitudes.

RQ1: How does one's Web-use orientation influence (a) perceptions of health website credibility and (b) attitude toward the health topic?

H3: Web-use orientation (searching vs. surfing) moderates the relationship between the presence of the six message characteristics and (a) credibility perceptions and (b) attitude about

the health topic. When searching, the presence of the six message characteristics more strongly predicts credibility perceptions and attitude about the health topic than when surfing.

H4: Web-use orientation (searching vs. surfing) moderates the relationship between the presence of the seven structural features of health websites and (a) credibility perceptions and (b) attitude about the health topic. When surfing, the presence of the seven structural features more strongly predicts credibility perceptions and attitude about the health topic than when searching.

3. Method

3.1. Participants

The study sample consisted of 86 undergraduate students recruited from Communication courses at a large Southwestern university. Participants' ages ranged between 19 and 32 years ($M = 20.87$, $SD = 1.78$). Sixty-three (73.3%) of the participants were female and 22 (25.6%) were male. One respondent did not report his/her sex. Sixty-eight (79.1%) of the participants were Caucasian, 7 (8.1%) were Hispanic/Latino, 3 (3.5%) were of Asian descent, 3 (3.5%) were African-American and 5 (5.9%) reported their ethnicity as "other" or reported multiple ethnicities. Undergraduate students are an appropriate sample for this study for two primary reasons. First, data from the Pew Internet and American Life Project (PIALP) (Fox, 2005, 2006; Fox & Rainie, 2002) indicate that young adults use the Internet and Web to acquire health information. In a recent survey by the PIALP (Fox, 2006), 79% of Internet users between the ages of 18 and 29 reported using the Internet to gather medical information. Second, the health conditions we selected for this study, which will be detailed in following paragraphs, are particularly relevant health issues for undergraduate students (as opposed to an older sample of non-student adults). Smoking cessation and Type I diabetes are health conditions that are especially germane to young adults.

3.2. Design

A 2×2 between-participants design was used in this study. Web-use orientation (searching/surfing) and the health topic (smoking cessation/Type I diabetes) were the independent variables. The health topic was manipulated in this study in order mitigate the possibility of fixed-message effects and increase the external validity of the study. That is, through randomly assigning participants to two health topics, we can be confident that the results of the study are not an artifact of a particular health topic. Additionally, it was necessary to choose a focused topic for participants to search about (as opposed to letting participants choose their own health topics) to exert some measure of control over the types of health websites to which participants were exposed.

Smoking and Type I diabetes were selected as the topics for this study because they are similarly chronic conditions with potentially serious long-term consequences. Although Type I diabetes may be less well known among undergraduate students than smoking cessation, it is a health condition that is germane to this group—Type I diabetes is typically, though not exclusively, diagnosed in children and young adults (Torpy, Lynm, & Glass, 2007). The Centers for Disease Control (2005) estimate that about 1 in every 400–600 children and adolescents has Type I diabetes. Data from a recent PIALP study (Fox, 2006) showed that 13% of Internet users between the ages of 18 and 29 reported searching for information about quitting smoking and 61% sought out information about a "specific disease or medical problem" that could include diabetes.

3.3. Procedure

The participants met in a computer lab and were informed that they would be completing an information-seeking task and a questionnaire. Participants were randomly assigned to one of the four experimental conditions: searching for smoking cessation information ($n = 21$), surfing about smoking cessation information ($n = 22$), searching for diabetes information ($n = 19$), surfing about diabetes ($n = 24$). The purpose of the information-seeking task was to assess participants' perceptions of the credibility of a particular Website during the search process; it is noteworthy that participants were unaware that the study focused on website credibility until after they had completed the task. Participants were told that they would have about 20 min to use the Web. After 17 min, participants were asked to print the webpage that they were viewing. Stopping participants during the search made it possible to identify a single webpage about which participants could make credibility assessments. Participants made their credibility assessments of this particular page, and this webpage was later content analyzed. After printing out the webpage, participants re-directed their browser to the web-based questionnaire containing measures of the dependent variables. The questionnaire took approximately 15 min to complete.

Searching and surfing were operationalized by manipulating the degree to which participants were asked to engage in focused and purposeful navigation of the Web. Participants in the searching condition were required to navigate the Web to find information that would achieve a specific goal (i.e., gathering health information to help their friend as opposed to simply passing the time). Participants in the searching conditions were asked to: "Imagine that you are scheduled to meet a close friend after you're done here to get some food and talk. Your friend is trying to quit smoking [has been diagnosed with Type I diabetes] and they want to talk about it." Participants were then informed that they should: "Please use the remaining time to search for information in order to help your friend. You should use the computer in front of you to search the World Wide Web for information about quitting smoking [Type I diabetes]." In the surfing conditions, participants were asked to: "Imagine that you are scheduled to meet a close friend after you're done here to get some food and talk. Your friend has recently been having some relationship problems and they want to talk about it." Participants were then instructed to: "Please use the remaining time to browse for information in order to pass the time until the study is complete. You should use the computer in front of you to browse the World Wide Web for information about quitting smoking [Type I diabetes]." Participants in the surfing condition were asked to browse the Web and did not have a specific information-acquisition goal to achieve.

3.4. Measures

Unless otherwise noted, all measures were rated on 7-point scales with the anchors *strongly disagree* and *strongly agree*. Larger scores indicate a greater amount of a variable.

3.4.1. Website credibility

Participants rated the credibility of the final webpage they viewed. As previously noted, website credibility was conceptualized as a multi-dimensional construct involving perceived trustworthiness and expertise. Following previous research on this topic (Flanagin & Metzger, 2000; Johnson & Kaye, 1998, 2002), participants were asked to rate the degree to which the final webpage they viewed was believable, trustworthy, accurate, complete, and biased (this item was reverse-scored).

A confirmatory factor analysis (CFA) was conducted with the five items modeled as indicators of the latent construct website

credibility. The factor loadings were inspected as well as the chi-square statistic for the model and two alternate fit-indices (Hu & Bentler, 1999): the comparative fit index (CFI) and standardized root mean-squared residual (SRMR). The results of the CFA suggested that the item assessing the degree to which the site was biased was problematic; the factor loading for this item was extremely low (.02). Accordingly, this item was removed and the analysis was re-run. The four-indicator model fit the data well; factor loadings for the items ranged from .67 to .87. Further, the chi-square test of the model was not significant, $\chi^2 (df = 2) = 2.74$, $p = .74$, and the alternate fit indices were acceptable: CFI = 1.0, SRMR = .02. Chronbach's alpha for this measure was .87. A mean score was computed for the four-item measure of website credibility ($M = 6.04$, $SD = .85$).

3.4.2. Attitude about the health topic

Participants rated their attitude about the health topic (smoking or Type I diabetes). Attitude was defined as an evaluation of a stimulus object derived from cognitive information, emotional information, or information about behavioral intentions or past behavior (Dillard, 1993; Zanna & Rempel, 1988). Participants rated their agreement with statements indicating that they would donate money to support research on the health topic, volunteer to work for an organization that helps those suffering from the health topic, vote for a bill to increase government funding for research on the health topic, and not donate money to support research on the health topic (this item was reverse-scored).

A CFA was conducted with the four items modeled as indicators of the latent construct attitude about the health topic. The model fit the data; the chi-square test was not significant, $\chi^2 (df = 2) = 2.76$, $p = .25$, and the alternate fit indices suggested adequate model fit (CFI = 1.0, SRMR = .02). Further, the factor loadings for the items in the measure ranged from .64 to .91. Chronbach's alpha for this measure was .85. A mean score was computed for the four-item measure of attitudes ($M = 4.76$, $SD = 1.29$).

3.4.3. Manipulation checks

Two measures were used to assess the effectiveness of the Web-use orientation manipulation. First, at the end of the questionnaire, participants completed a two-item, self-report measure. Participants rated their agreement with statements indicating that they surfed through different sites without paying too much attention to details and browsed through the information on different sites. A mean for these two items was computed as a measure of surfing behavior ($M = 4.34$; $SD = 1.18$). Second, the number of unique websites participants viewed during the study was recorded and used as an objective measure of Web-use orientation ($M = 5.32$, $SD = 3.38$). Software that, unbeknown to participants, recorded all websites visited by a particular user was installed on each computer. Given the less goal-directed nature of surfing behavior, those in the surfing condition were expected to view more unique websites during the study.

3.4.4. Control variables

Two control variables were included in the study. First, as previously discussed, the health topic about which participants sought information was manipulated in this study and included as a control variable in the tests relevant to the hypotheses and research question. Second, the number of websites viewed by participants was included as a control variable. Although it was expected that those in the surfing condition would visit more websites than those who were asked to search for information, it is important to control for this variable. Controlling this factor makes it possible to ensure that the results regarding Web-use orientation are not simply an artifact of the number of websites participants viewed.

3.5. Content analysis of message characteristics and structural features

The final webpage viewed by participants was content analyzed to identify the presence (coded as 1) or absence (coded as 0) of six message characteristics and seven structural features. The message characteristics were derived from Hong's (2006) research and include: authorship of the message, indicator of message currency (date posted or updated), references (the citation of external sources for information), statistical information (excluding monetary information), testimonials (such as a story or account), and quotations (appearing in the main text of the webpage). The sum of the six possible features was computed and used as a measure of the prevalence of message characteristics on the final webpage viewed by participants ($M = 1.79, SD = 1.29$).⁵

The structural features were derived from a review of previous research (e.g., Fogg et al., 2001, 2003; Hong, 2006) and consisted of the features of a site that are distinct from the message content on a webpage. Structural features examined in this study include: the name of the organization or person operating the website, third-party endorsements, images (that were not part of an advertisement), the presence of a physical address or telephone number, a link to the website's privacy policy statement, a navigation menu (serving as a directory for the website), and links to external websites. The sum of the seven structural features was computed and used as the measure of the prevalence of structural features on the final webpage viewed by participants ($M = 3.72, SD = 1.48$).

Two doctoral students (not affiliated with the study) served as coders. A printed copy of the final webpage viewed by participants was provided to the coders and examined to determine the presence of structural features and message characteristics. To establish intercoder reliability, approximately 35% of the websites were independently rated by each coder. Intercoder agreement was computed using Scott's pi (Potter & Levine-Donnerstein, 1999), which accounts for coder agreement due to chance. Scott's pi ranged from .84 to 1.0 for all 13 of the message characteristics and structural features. Disagreements were jointly discussed and resolved. The remaining webpages were divided equally between the two raters and independently coded. The frequencies and a description of each category of message characteristics and structural features are provided in Table 1.

4. Results

4.1. Preliminary analysis

The data were first screened following the recommendations established by Tabachnick and Fidell (2001). Univariate descriptive statistics were inspected for all items to identify out-of-range values and outliers. Two outliers were identified for the measure assessing the number of websites participants viewed during their search and were addressed following Tabachnick and Fidell's recommendations. The outliers were reassigned a value of 15, which is approximately one unit greater than the upper-bound limit of the 95% confidence interval for the measure. Refer to Table 2 for the correlations among all measured variables in this study.

A check was performed to verify the effectiveness of the Web-use orientation manipulation. Two one-way ANOVAs were con-

ducted with the self-report measure of surfing behavior and the number of websites viewed by participants serving as dependent variables. As expected, those in the surfing condition were significantly more likely to self-report that they engaged in surfing behavior ($M = 4.59, SD = 1.09$) than those in the search conditions ($M = 4.06, SD = 1.22$), $F(1, 84) = 4.42, p = .04, \eta^2 = .05$. Also as expected, those in the surfing condition viewed significantly more websites ($M = 6.00, SD = 3.72$) than those who searched for information ($M = 4.44, SD = 2.69$), $F(1, 74) = 4.48, p = .04, \eta^2 = .05$.

4.2. Web-use orientation, message, and structural characteristics as predictors of website credibility perceptions

Prior to conducting the analysis, the variables assessing message characteristics and structural features were both mean-centered to facilitate interpretation of the results (Aiken & West, 1991). Additionally, two interaction terms were created by multiplying Web-use orientation by the two mean-centered variables. To test the study hypotheses and answer the research question, two hierarchical regression models were tested. The procedure used to test both models was the same; the only difference in the models was the outcome variable (credibility or attitude). The health topic (smoking cessation was coded 0; Type I diabetes was coded 1) and the number of websites visited during the search were entered into the first block of the models as control variables. In the second block, Web-use orientation (surfing was coded 0; searching was coded 1) and the mean-centered variables representing the sum of the message characteristics that were present on the webpage and the sum of the structural features available on the webpage were entered. In the third block, the interaction between Web-use orientation and the mean-centered message characteristics variable as well as the interaction between Web-use orientation and the mean-centered structural features variable were entered. The results of the regression models with credibility and attitudes as the outcome variables are presented in Tables 3 and 4, respectively.

Hypotheses 1a and 1b forwarded that message characteristics would be associated with perceptions of website credibility and attitudes about the health topic. Tables 3 and 4 illustrate the results in regard to these hypotheses. Consistent with H1b, when accounting for the control variables, message characteristics were significantly associated with attitudes about the health topic, $\beta = .27, p = .01$. The more message characteristics that were present on the final webpage, the more positive participants' attitudes were about the health topic. However, message characteristics were not associated with credibility perceptions, $\beta = .04, p = .40$. H1a was not supported.

Hypotheses 2a and 2b predicted that the structural features present on the health website would be associated with perceptions of website credibility and attitudes. Tables 3 and 4 illustrate the results relevant to these hypotheses. H2a was supported. After accounting for the variance explained by the control variables, structural features were positively associated with perceptions of website credibility, $\beta = .27, p = .02$. H2b, however, was not supported. Structural features were not associated with attitudes about the health topic, $\beta = .19, p = .08$.

Hypotheses 3a and 3b predicted an interaction between one's Web-use orientation and the presence of message characteristics on perceptions of website credibility and attitudes about the health topic. The interaction relevant to H3a was significant, $\beta = -.30, p = .05$, indicating that there was a difference in the relationship between message features and credibility perceptions dependent upon whether participants were surfing or browsing. To interpret this interaction, separate coefficients were computed for the surfing and searching conditions (Aiken & West, 1991). When surfing, the relationship between the presence of message

⁵ Principal components or confirmatory factor analysis is not appropriate for the measure of message characteristics or website structural features. For the message characteristics and structural features, the presence or absence of each characteristic or feature was assessed. As such, principal components analysis would simply identify those characteristics or features that co-occurred. Principal components analysis would not necessarily tap an underlying construct. Thus, we elected to create the measures of message characteristics and structural features using the sum of the number of structural features and message characteristic that were present on the final webpage viewed by participants.

Table 1
Categories of message characteristics and structural features of websites ($N = 86$).

Category	Frequency	Description
<i>Message characteristics</i>		
Statistics	47	Pages with at least one piece of numeric information (excluding monetary values) were coded as 1; pages with no numeric information were coded as 0
Information currency	40	Any indication (such as a date last updated) of the currency of information on a page was coded as 1; pages with no information about the currency of the information were coded as 0
Information reference	30	The presence of at least one outside citation for the reference information provided on a page was coded as 1; pages with no citations were coded as 0
Author information	24	An author's name (or multiple authors' names) was information provided as having written or edited the contents of the page. The presence of author information was coded as 1; pages without author information were coded as 0
Testimonials	6	Pages with stories, accounts, or narratives and were coded as 1; pages without testimonials of any kind were coded as 0
Quotations	7	Pages with a quote regarding the health topic appearing in the main text of the website were coded as 1; the absence of a quote was coded as 0
<i>Structural features</i>		
Name	82	Pages that included the name of the organization or person operating the site were coded as 1; pages without a name were coded as 0
Navigation menu	66	Pages with a menu or list that served as a directory for the website were coded as 1; pages that did not include a directory were coded as 0
Privacy policy	56	Pages with a link to the website's privacy policy statement were coded as 1; pages with no reference to a privacy policy were coded as 0
Links to external sites	49	Pages that included links to external websites were coded as 1; pages that did not include external links were coded 0
Images	36	Pages with at least one picture or illustration that was not part of an advertisement were coded as 1; pages without an image were coded as 0
Physical address	19	Pages with a contact address or phone number for the or phone number organization were coded as 1; pages without any contact information were coded 0
Third-party	12	Pages with an accreditation or third-party endorsement (e.g., Health on the Net Foundation) were coded as 1; pages without an endorsement were coded 0

Table 2
Correlation coefficients for all variables ($N = 86$).

Variable	1	2	3	4	5	6	7
1. Topic (smoking cessation = 0)							
2. Web-use orientation (surfing = 0)	-.05						
3. Websites viewed during search	-.27*	-.23*					
4. Structural features	-.24*	.02	.03				
5. Message characteristics	-.16	.03	.05	-.01			
6. Credibility	.14	.12	-.14	.23*	.02		
7. Attitude	.27*	.14	-.24*	.12	.16	.26*	

* $p \leq .05$.

Table 3
Results of the hierarchical regression model with website credibility as the outcome ($N = 77$).

	β	t	R^2
Step 1: Control variables			.04
Topic (smoking cessation = 0)	.15	1.25	
Websites viewed during search	-.10	-0.84	
Step 2: Main effects			.12
Message characteristics	.04	0.40	
Web-use orientation (surfing = 0)	.07	0.63	
Webpage structural features	.27	2.41*	
Step 3: Interaction effects			.17
Orientation X message characteristics	-.30	-1.97*	
Orientation X structural features	.11	0.75	

Note. Message characteristics and structural features were mean-centered for the tests of the main and interaction effects.

* $p \leq .05$.

Table 4
Results of the hierarchical regression model with attitudes about the health topic as the outcome ($N = 76$).

	β	t	R^2
Step 1: Control variables			.09
Topic (smoking cessation = 0)	.19	1.65	
Websites viewed during search	-.19	-1.62	
Step 2: Main effects			.20
Web-use orientation (surfing = 0)	.12	1.08	
Message characteristics	.27	2.54*	
Webpage structural features	.19	1.76	
Step 3: Interaction effects			.21
Orientation X message characteristics	-.06	-0.39	
Orientation X structural features	.01	0.08	

Note. Message characteristics and structural features were mean-centered for the tests of the main and interaction effects.

* $p \leq .05$.

features and perceived website credibility was positive, $\beta = .24$; when searching, the relationship between these two variables was negative, $\beta = -.12$. Because we predicted that the presence of the six message characteristics would more strongly predict credibility perceptions when searching, we conducted a test comparing the difference in the absolute size of these two regression coefficients (Cohen, 1983). The t -test was not significant, $t(72) = .56$, $p > .05$. Further, we expected that, when searching, the association

between message characteristics and structural features would be positive. These findings were unexpected and will be addressed further in the discussion section of the manuscript. H3b was not supported. As illustrated in Table 3, there was no interaction between Web-use orientation and message characteristics on attitudes, $\beta = -.06$, $p = .70$.

Hypotheses 4a and 4b predicted an interaction between Web-use orientation and the presence of structural features on per-

ceptions of site credibility and attitudes. Neither of these hypotheses was supported. The interaction between orientation and structural features on credibility was not significant, $\beta = .11$, $p = .45$. Similarly, the interaction between Web-use orientation and structural features on attitudes was not significant, $\beta = .01$, $p = .94$.

Finally, Research Question 1a and 1b asked how participants' orientation toward using the Web influenced their perceptions of health website credibility and attitude toward the health topic. The results are presented in Tables 2 and 3. There was no difference in perceptions of credibility, $\beta = .07$, $p = .53$, nor attitudes, $\beta = .12$, $p = .29$, based on whether participants were searching or surfing for health information.

5. Discussion

The results of the study indicated several important findings. First, message characteristics and the structural features of websites were related to perceptions of website credibility and attitudes about the health topic. In particular, the presence of structural features of health websites was positively associated with perceptions of website credibility. The more features that were present, such as a navigation menu and links to external websites, the more credible a website was rated by participants. Additionally, message characteristics were positively associated with attitudes about the health topic. The more features such as statistics, quotes, and identification of authorship that appeared on the final webpage, the more positive participants' attitudes were about the health topic.

The preceding findings suggest different implications for message characteristics and structural features of health websites.⁶ Structural features of health websites are particularly important in shaping perceptions of a particular website. Structural features have been argued to function as heuristic cues and provide markers that individuals can use to quickly assess the credibility of a site (Dutta-Bergman, 2004). A street address, privacy policy statement, and third-party endorsement may serve to indicate that a site is legitimate by making it appear that a brick-and-mortar establishment exists that visitors could hold accountable. Similarly, features such as the inclusion of a navigation menu or images may serve to reinforce the idea that the organization operating the site is professional. In contrast, the positive relationship between message characteristics and attitudes suggests that these characteristics may have an influence beyond the particular website on which they are presented. The influence of message characteristics may extend beyond perceptions of a single website to broader attitudes about a health topic.

For practitioners, the preceding findings indicate that the same meticulous planning and development that may go into the creation of health messages should be applied to the construction of health website. The inclusion of structural features such as the organization's physical address may be, as the findings of this study suggest, exceptionally important in determining how credible the website is perceived by visitors. Similarly, although they may not have an immediate impact on perceptions of the organization's website, the inclusion of statistics, references, and other message characteristics may play a role in broader attitudes about the health topic.

A second key finding from this study is that Web-use orientation only played a small and unexpected role in as a moderator var-

iable. Web-use orientation moderated the relationship between message characteristics and perceptions of website credibility. However, the presence of the six message characteristics did not more strongly predict credibility perceptions when searching than when surfing; there was no difference in the absolute size of the beta coefficients representing the relationships between message characteristics and credibility in the surfing and searching conditions. Further, message characteristics were positively associated with credibility perceptions when participants were surfing. One possible explanation for this result is that the message characteristics assessed in this study served as heuristic cues for those participants in the surfing condition. The content analysis focused on the determining the presence or absence of particular message characteristics (e.g., quotes, statistics, references); the quality of these characteristics was not considered. As a result, the presence of the message characteristics could have signaled to participants in the surfing condition that the website was credible. Individuals searching for information, however, may have been more likely to go beyond simply noting the presence of such characteristics and actually evaluate their merit.

It is also important to consider some of the non-significant results from this study. In particular, the interaction between Web-use orientation and structural features was not significant for perceptions of website credibility nor attitudes about the health topic. One explanation for these outcomes is that structural features were important regardless of one's Web-use orientation. Indeed, there was a significant relationship between structural features and perceptions of website credibility and the relationship between structural features and attitudes approached significance. The presence of structural features is immediately evident to website visitors. As a result, these features may influence perceptions of site credibility regardless of whether one is surfing or searching.

Taken as a whole, the findings from this study offer limited evidence for the utility of Web-use orientation as a moderator of the relationship between site and message factors and perceptions of website credibility or attitudes. As previously noted, one explanation for this outcome is the way in which message characteristics and website features were operationalized in this study. Through counting the number of characteristics or features, we did not take into account their quality. However, the approach used in this study was necessary in order to try to assess website perceptions as they develop during the information-acquisition process. Given the goal of examining the aggregate influence of several characteristics and accounting for the information-seeking process, it was not feasible to assess the quality of each structural feature or message characteristic. A second explanation is that an information seekers' Web-use orientation is unimportant in the realm of website credibility. Web-use orientation may be more influential in other domains, such as an information-seeker's ability to learn and retain information from a health-related website.

5.1. Limitations and directions for future research

Although several notable implications were derived from the study, the limitations should also be considered. In particular, the sample was limited to undergraduate students and may not fully represent the breadth of the population using the Web to acquire medical information. However, it should be noted that individuals of this particular age range comprise a sizable proportion of online health information seekers. Further, the health conditions that served as the focus of this study are medical conditions that are germane to young adults. Smoking cessation is an issue facing a noteworthy percentage of young adults; though less common, Type 1 diabetes is a condition that is typically diagnosed in children and young adults. A second limitation of this study is that the manipulations of searching and surfing using hypothetical

⁶ In discussing the preceding findings, it should be noted that the message characteristics and structural features were not formally manipulated in this study. As such, it is not possible to make definitive causal claims about the linkages between message and website attributes and credibility or attitudes. Given our goal of assessing the development of credibility perceptions during the information-seeking process and the concomitant influence of several message and website attributes, the findings are nonetheless of value.

scenarios was somewhat contrived. Yet, using hypothetical scenarios made it possible to strike a balance between experimental control and ecological validity. That is, the manipulation of searching and surfing made it possible to assess participants' perceptions of website credibility during the process of acquiring health information, while controlling for potentially confounding factors including, but not limited to, the nature of the health topic, individual for whom the information is being sought (e.g., self, family member, co-worker, etc.), and time spent acquiring information. A final limitation is that, in focusing on the credibility perceptions during the information-seeking process, this study did not assess the relationship between specific message characteristics and structural features and perceptions of website credibility. The measures of structural features and message characteristics were created by summing those structural and message components that were present in the webpage rated by participants. Although it was not possible to examine the influence of specific message and structural components, this approach made it possible to investigate the information-acquisition process in which individuals play an active role and are simultaneously exposed to multiple message characteristics and structural features.

The results of this study also suggest a few key directions for future research. Structural features of websites and message characteristics appear to have some impact on the perceived credibility of health-related websites. Future research should explore how these two factors shape credibility perceptions throughout the course of the information-seeking process. The analysis conducted in this study were based on one webpage viewed by participants during their search, offering a snapshot of the credibility perceptions during the process of acquiring medical information online. It would be useful for future research to explore the ebb and flow of credibility perceptions in real-time. One possibility is to ask information seekers to report their credibility perceptions at multiple time points during a search and attempt to examine the cumulative impact of viewing different health websites. The order in which the sites are viewed or the nature of the different sites examined during a search may lead participants to hold different perceptions of what constitutes a credible webpage. Future research should also continue to examine factors that may moderate the relationship between website attributes (i.e., structural features and message characteristics) and perceptions of website credibility. One approach is to focus on specific Web-use motivations such as acquiring information for instrumental purposes or to satisfy emotional needs such as the need to feel understood (Nettleton, et al., 2004). It may be that a motivation such as seeking empathy encourages Web users to focus less on message content and more on heuristic cues to assess a site's credibility; in contrast, someone seeking information to make a decision may be more inclined to focus on the messages contained on a site to assess the site's credibility. Future research should consider the implications of the "Web 2.0" environment for perceptions of website credibility. It would be worthwhile to determine the strategies information seekers use to evaluate the credibility of individual contributors to health-related blogs or wikis, for example. Finally, it is important to explore how credibility perceptions impact health behaviors, studying whether individuals are likely to pass on the information they acquire online to others or change their own health behaviors. By examining how information acquired online influences health behaviors, the long-term consequences of credibility can be further investigated.

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