This article explores the associations that message features and Web structural features have with perceptions of Web site credibility. In a within-subjects experiment, 84 participants actively located health-related Web sites on the basis of two tasks that differed in task specificity and complexity. Web sites that were deemed most credible were content analyzed for message features and structural features that have been found to be associated with perceptions of source credibility. Regression analyses indicated that message features predicted perceived Web site credibility for both searches when controlling for Internet experience and issue involvement. Advertisements and structural features had no significant effects on perceived Web site credibility. Institution-affiliated domain names (.gov, .org, .edu) predicted Web site credibility, but only in the general search, which was more difficult. Implications of results are discussed in terms of online credibility research and Web site design.

Introduction

The appeal of anytime instantaneous medical information within the privacy of one’s home has attracted 80% of American Web users, or half of the general public, to search online for health-related information (Pew, 2003b). Such consumer empowerment addresses some of the historic concerns related to medical care, including patient needs for more detailed medical information (Charles, Gafni, & Whelan, 1997) and a more participatory role in making health care decisions (Guadagnoli & Ward, 1998). Undermining the potential benefits of the Internet as a purveyor of health-related information, however, are the ubiquity of inaccurate, incomplete, and outdated online information, as well as the potentially dire consequences associated with the use of such information. In at least one documented case, an individual was hospitalized after using a product purchased from a health content site on the Web (Weisbord, Soule, & Kimmel, 1997). Several empirical evaluations of health-related Web sites have found information that contradicted medical knowledge (Berland et al., 2001; Griffiths & Christensen, 2000), circumvented established medical guidelines (Impicciatore, Pandolfini, Casella, & Bonati, 1997; Latthe, Latthe, & Charlton, 2000; McClung, Murray, & Heitlinger, 1998), and was unconventional (Beredjiklian, Bozentka, Steinberg, & Bernstein, 2000; Soot, Moneta, & Edwards, 1999). The problems associated with such sites would be irrelevant if health-information seekers flocked to sites sponsored by established organizations (e.g., Centers for Disease Control [CDC] and the American Medical Association [AMA]). Research indicates, however, that the majority of health-information seekers do not have a specific site in mind during Web searches (Pew, 2002). That no specific Web site is in the search frame of health-information seekers suggests that they are not going directly to the site of an established health organization and, instead, are browsing any number of sites that pertain to their search topic, including sites that may provide inaccurate, incomplete, and outdated information. That most health-information seekers do not have a specific site in mind during their searches further suggests that they may have little or no knowledge of the source (the Web site). This lack of knowledge raises an important question: In the absence of knowledge of the source, what factors determine the perceived credibility of a health-related Web site?

The literature on source credibility, which has been used extensively in research in the area of online credibility, suggests that characteristics of the source can determine perceptions of credibility. However, in the absence of knowledge of the source, as is the case with some online health information, characteristics of the source reveal very little about credibility. Although previous research suggests that in the absence of knowledge of the source the attributes of the message are used to ascertain source credibility (Austin & Dong, 1994; Eagly & Chaiken, 1993; Slater & Rouner, 1997), the relationship between message features and credibility perceptions of online sources has not been extensively explored. Moreover, when message attributes have been studied, they have often not been differentiated from the...
structural features of the Web site. Such a distinction is important in creating a theoretical framework for the development of perceptions of Web site credibility.

The current study addresses these shortcomings by examining the influence that message features and structural features of the Web have on perceptions of Web site credibility. This is achieved in an experimental study in which participants actively locate online health-related information for two distinct search tasks. The sites they selected are then content analyzed for message and structural features.

Message and Structural Features

Message attributes pertain to the characteristics of a message that lend support to the perceived credibility or believability of the overall message or of the source of the message (Metzger, Flanagin, Eyal, Lemus, & McCann, 2003; Self, 1996). Clearly, in any given message, there are numerous attributes, including the organization of the message and the use of evidence. In the speech communication literature, the delivery of the message, including speed of speech, has been associated with credibility (Perloff, 1993). These and other message attributes are often categorized as message organization, message delivery, and message content (Metzger et al., 2003). Of concern to this current study is research in the area of message attributes, which are the actual message content features that can influence credibility perceptions. Some message content features found to influence credibility perceptions are argument quality or rigor (Porpapitakpan, 2004) and the use of evidence (Hamilton, 1998). For example, the use of relevant and high-quality evidence in messages is associated with perceived credibility (Hamilton, 1998). Fewer studies have emphasized the relationship between message content and perceived credibility in terms of the online medium. However, recent research elaborating on message content attributes that constitute information quality has found that the currency of information and presence of author credentials contribute to information quality (Rieh & Belkin, 1998; Rieh & Belkin, 2000). Although information currency and other related message content attributes have been previously studied in the offline media, navigation tools, domain names, and related Web site features have not. Recent research has demonstrated that navigation tools such as site maps (Fogg et al., 2001) and uniform resource locators (URLs) containing an .org or .edu domain name (Rieh & Belkin, 1998; Rieh & Belkin, 2000) enhance online credibility perceptions.

Clearly, the recent research on the association between online message content and perceived credibility includes message attributes that did not exist during the time of early research on message credibility. Such new message content attributes associated with credibility can be called structural features of the Web because they constitute elements fundamental to the composition of Web sites. In addition to domain names and site maps, structural features include online privacy policies, third-party seals of endorsement, and advertisements in the form of banners or hyperlinks. In contrast, message features are the attributes of message content articulated by early research on message credibility that reflect a specific element of the body of the text such as information currency, author credentials, testimonials, and statistics.

Distinguishing message features from Web structural features is important in the development of a theoretical basis for credibility research for two reasons. First, one of the criticisms of the credibility literature is that the context by which credibility assessments are made is often confounded (Eastin, 2001; Kiousis, 2001; Metzger et al., 2003; Sundar, 1998). This is especially pronounced in terms of the online medium, in which Web credibility has been measured with perceptions of the source, perceptions of the message, or a combination of the two (Metzger et al., 2003). Such indiscriminate application of credibility measures makes it difficult to assess which attributes—those of the structure or those of the message—predict the overall credibility of the Web site.

Second, Web site structural features are conceptually distinct from message features in that they are inherent to the interactive nature of Web sites such that their relative contribution to overall Web site credibility perceptions should be assessed separately. For example, domain name is unique to the Web and has not been previously studied in message credibility literature. Studies that have examined message quality in the online medium often do not distinguish message features from structural features. Generally, experimental studies have examined the influence of message features or the influence of structural features, but none has examined both message and structural features as related to Web site credibility. For example, message features such as quotations in online news (Sundar, 1998) and Web structural features such as third-party endorsements (Palmer, Bailey, & Faraj, 2000) both enhance perceptions of credibility.

Information perusal on the Web, however, is intricately tied to the structural features of the Web such that message features and structural features should be assessed simultaneously as a means to testing the relative influence of these two types of features. The majority of Web sites consist of both message features (e.g., author credentials, testimonials) and structural features (e.g., menus, frames, endorsement seals). Moreover, research has found that Web site structural features by themselves contribute to overall perceptions of the Web site. For example, navigation menus have been shown to enhance organization (Chen & Wells, 1999). Although previous research has examined only the effect that message features have on credibility perceptions in the offline medium, the relative impacts of message features and structural features on perceptions of online credibility are unknown. Thus, distinguishing the effects of message and structural features on perceived credibility is important to understanding Web site credibility.

Source Credibility and Message Evaluation

Sources in credibility research have included media, organizations, and the individual spokesperson (O’Keefe, 2002; Wathen & Burkell, 2002). For the online medium, the
individual Web site has been viewed as the source, with the
credibility of the site often referred to as Web site credibility
(e.g., Eighmey & McCord, 1998; Shon, Marshall, & Musen,
2000). Although various characteristics of the source that
make it believable have emerged from previous research,
there is no consensus on a set of credibility dimensions (Self,
1996). Moreover, credibility judgments are contingent upon
the type of source being evaluated and the context of the eval-
uation (Stamm & Dube, 1994). Such contingency suggests
that a universal credibility scale is not theoretically useful.
For these reasons, this article employs the most widely used
dimensions of credibility from the literature. The two most
common dimensions of credibility are trustworthiness and
expertise, originally defined in the early studies of Hovland,
Janis, and Kelley (1953). In addition, the dimensions bias/fairness and depth appear frequently in credibility
scales, including the widely used scale of Gaziano and
McGrath (1986). Finally, McCroskey and Teven (1999) argue
convincingly that goodwill should be included because it was
originally included in Aristotle’s conception of the speaker’s
“ethos,” as well as in initial studies on source credibility.

As suggested by the sheer number of credibility dimen-
sions, the primary focus in the extant literature on source
credibility has been determining the characteristics of the
source that are associated with perceptions of credibility
(Self, 1996). In contrast, the attributes of the message asso-
ciated with perceptions of credibility have received less
emphasis in the credibility research literature. Research in
the area of message credibility, as it is often termed, exam-
ines the association between message attributes and either
the credibility of the message or the source of the message.
That message credibility and source credibility are concep-
tually related was noted in an early review of experimental
studies that found that message impact is related to source

Although the prevailing approach has been that assess-
ments of the source would influence message judgment,
there is evidence to suggest that the reverse is also possible.
Previous work on credibility has indicated that in the ab-
sence of knowledge of the source, the audience relies on
judgments of the message to determine source credibility
(Rosenthal, 1971). Reliance on message cues to determine
source credibility is also found in situations in which little
information is available about the source (Eagly & Chaiken,
1993). Thus, in information assessment contexts in which
little or no information about the source is known, research
has found that evaluations of message quality predict source
credibility assessments (Slater & Rouner, 1997). In addition,
message evaluation is more strongly associated with overall
assessments of credibility than assessments of source char-
acteristics (Austin & Dong, 1994). These studies suggest
that the evaluation of the message is associated with percep-
tions of source credibility and may be more important than
source characteristics in determining perceptions of credibil-
ity. Despite such influence, the impact of message attributes
on source credibility has not been explored as extensively as
the impact of source characteristics (Slater & Rouner, 1997).

Although previous research has implemented a holistic
measurement of message quality as it relates to source cred-
ibility, specific message features and Web structural features
should be distinguished to examine their relative associa-
tions with perceived source credibility. The remainder of
the literature review identifies specific message and structural
features that have been previously found to be associated
with source credibility.

Message features and credibility. The features of a mes-
 sage that are associated with credibility appear in three areas
of the literature: message credibility (O’Keefe, 2002), infor-
mation accountability (Winker et al., 2000), and information
quality (Rieh, 2002; Rieh & Belkin, 1998); all three areas
pertain to specific aspects of the message that contribute to
perceptions of credibility. In terms of message credibility,
several message features have been found to be associated
with credibility perceptions, including the use of quotes, tes-
 timonials, and statistics (O’Keefe, 2002). Examining online
news, Sundar (1998) found that stories that included quotes
were perceived to be more credible than stories that did not.
In terms of the literature on information accountability, sev-
eral major health organizations have developed accountabil-
ity guidelines to assist consumers in assessing the credibility
of health-related Web sites (e.g., Winker et al., 2000).
Emerging in response to concerns about the ubiquity of
health-related information that does not meet medical stan-
dards, these accountability measures are intended to assist
consumers in looking for specific elements of the message to
ascertain the credibility of the information provider. Some of
the most common elements are disclosure of authorship, ref-
ence to sources of information, information currency
(posted dates of content modification), and criteria for infor-
mation selection (Kim, Eng, Deering, & Maxfield, 1999;
Silberg, Lundberg, & Musacchio, 1997; Winker et al., 2000;
Wyatt, 1997). These categories are similar to those used by
research on information quality that has found that informa-
tion currency, authorship, and other message features are as-
associated with credibility (Rieh, 2002; Rieh & Belkin, 1998).

Although different terms have been used for message fea-
tures, they all pertain to specific aspects of the message that
influence perceptions of credibility. These observations on
message quality, information accountability, and informa-
tion quality are captured in the following hypothesis:

H1: Message features are positively associated with percep-
tions of Web site credibility.

Structural features and credibility. Web site structural fea-
tures that have been found to contribute to perceptions of
credibility include top-level domain name, navigation tools,
presence of a privacy policy statement, third-party endorse-
ments, site ownership, site contact information, and, specific
to health-related Web sites, inclusion in the Health on the
Net Network (HON network). In terms of domain names,
sites with the .edu, .org, and .gov top-level domain names
characteristic, audience factors are important determinants on credibility judgments needs to be taken into account. Third-party endorsements have also been found to be associated with credibility perceptions (Palmer et al., 2000; Alexander & Tate, 1999). TRUSTe, BBB, and VIPPS, some of the most common third-party endorsers, provide an emblem or seal with their respective logo. Specifically for health-related Web sites, HON network is a third-party endorser that certifies health-related Web sites on the basis of meeting the organization’s criteria. The inclusion of privacy policies, such as privacy seals, further enhances credibility assessments (Palmer et al., 2000). In addition, frames or site maps facilitate perceptions of site organization (Chen & Wells, 1999) and have been reported to enhance perceptions of credibility (Fogg et al., 2001). Finally, site contact information (P. Kim et al., 1999) and disclosure of site ownership (Winker et al., 2000) enhance perceptions of information quality. Whereas these structural features have been found to enhance credibility perceptions, the presence of advertisements has been negatively associated with perceived credibility (Fogg et al., 2001). Thus, the presence of Web advertisements, which include hyperlink, banner and other graphically-based ads, decreases perceived Web site credibility. The preceding observations are captured in the following hypotheses:

H2: Web structural features are positively associated with perceived Web site credibility.
H3: Web sites with institution-affiliated domain names are perceived to be more credible than Web sites with commercial domain names.
H4: Advertisements are negatively associated with perceived Web site credibility.

Relative Influence of Message and Structural Features

Although past studies suggest that both message features and Web structural features are positively associated with perceptions of source credibility, the relative influence of these two distinct aspects of a Web site on credibility perceptions is unclear. Clarifying this matter is important in addressing the criticism that the contexts by which credibility assessments are made are often confounded. An examination of the relative influences of message features and structural features is one step toward addressing this shortcoming. That one feature may be more predictive of perceived source credibility than another feature may prove to be instrumental in the design of health-related Web sites that seek to inform and persuade health-information seekers.

In determining the relative contributions of message features and structural features, the influence of audience factors on credibility judgments needs to be taken into account. Because credibility is a receiver assessment and not a source characteristic, audience factors are important determinants of source credibility (Gunther, 1988, 1992). Moreover, credibility is a relational construct in which credibility judgments are contingent on the receiver’s relationship to the medium, source, and message (Stamm & Dube, 1994). An audience factor that is particularly relevant to perceptions of credibility within the online medium is Internet experience (Corritore, Kracher, & Wiedenbeck, 2003; Fogg, 2003). Specifically, those who are highly skilled and experienced with the Internet tend to be especially skeptical of sites and disregard accurate information, thus committing “incredulity errors” (Fogg, 2003). In contrast, those who are not highly experienced may be more easily persuaded to accept information that is not accurate, thus committing “gullibility errors.” In addition to Internet experience, issue involvement has been found to bias perceptions of credibility (Metzger et al., 2003). Individuals who are highly involved in an issue are likely to perceive themselves as knowledgeable about the issue, to hold more polarized opinions regarding the issue, and, in general, to be more prone to “biased processing” (Gunther, 1992). One study found that involvement predicted more variance in respondents’ credibility judgments than any other audience factor (Gunther, 1992). That Internet experience and issue involvement influence perceptions of credibility suggests that these audience factors should be controlled for in the analysis to determine the relative influences of message features and Web structural features on perceived Web site credibility. These observations are stated in the following research question:

RQ1: What are the relative influences of message features and Web structural features on perceptions of Web site credibility when controlling for Internet experience and issue involvement?

Methods

Research Design

This study utilized data from a within-subjects experiment and a content analysis of Web sites that resulted from two search tasks. The experiment is a two-group within-subjects repeated measures design (Cook & Campbell, 1979) in which two searches are manipulated by task specificity. To minimize order effects, the sequence of the two searches was randomly assigned. Research on navigation behavior has utilized similar repeat-measure research designs (e.g., Kim & Allen, 2002). Participants physically searched the Web for health information related to tobacco use cessation. The search topic of tobacco use cessation was chosen because of the health topic’s pertinence to the general public, as well as the sample of undergraduates in the study. In addition, recent research suggests that the tobacco industry and the various organizations sympathetic to it have asserted their influence on the content of tobacco-related sites. As result, online health-related information on tobacco use is often incomplete and tends to promote tobacco use by glamorizing smoking (Ribisl, 2003; Simpson, 2001). Thus,
tobacco use is an appropriate health search topic for a study concerned with perceptions of credibility within an online information-seeking context.

Participants were instructed to search through as many Web sites as necessary until they found a Web site containing information they felt comfortable giving to a family member or friend who had requested their assistance, a fairly common occurrence. Participants were asked to search on behalf of a family member or friend who was a smoker interested in smoking cessation. Searching for health information online on behalf of a family member or a friend who had requested their assistance, a fairly common occurrence (Pew, 2003b; Widman & Tong, 1997).

The final Web site selected by a participant was the one used for credibility assessments. After completion of the experiment, an independent content analysis for message and structural features was conducted for the Web sites that resulted from the two searches. The experimental study and the content analysis instrument were pretested on a group of undergraduate and graduate students.

Experiment Treatment Conditions

The two searches were distinct in their task specificity and complexity. Previous research has found that search performance and search patterns differ on the bases of task specificity and complexity (Saracevic & Kantor, 1988). Task specificity has numerous subcontracts, including open and closed (Marchionini, 1989), broad and specific (Saracevic & Kantor, 1988), and general and specific (Qiu, 1993); the third dichotomy was used in the current study. In general, more specific tasks result in fewer pages accessed and less time devoted to a search than more general tasks (Kim & Allen, 2002). Thus, specific search tasks are less difficult than general search tasks because they require less task effort.

There were two searches based on task specificity. The general search task asked participants to locate any tobacco use cessation strategy, and the specific search task asked participants to locate a specific tobacco use cessation method. No specific tobacco product was identified because the population of college students is known to use a variety of tobacco products other than cigarettes, including cigars, pipes, chewing tobacco, and snuff (Rigotti, Lee, & Wechsler, 2000).

Before the general search task, participants were given a handout containing the following instructions:

A family member/friend of yours wants to quit smoking, but he doesn’t know what would be a good strategy. You want to help this family member by finding a good strategy on the Web. Search through as many Web sites as necessary until you have located the site with the information you feel you can give to this family member. Because this information is very important to this family member, you want information that is of high quality. When you have located this site,

1 Participants were asked to search on behalf of a family member or friend on the topic of tobacco use cessation because of the difficulty of recruiting participants who are current smokers who have an objective of quitting smoking. All participants reported that they knew of a family member or friend who was a smoker interested in smoking cessation. Searching for health information online on behalf of a family member or a friend is fairly common.

Before the specific search task, participants were given a handout containing the following instructions that directed them to locate information on nicotine gum, the nicotine patch, nicotine nasal spray, or the nicotine inhaler:

The family member/friend who wants to quit smoking has recently heard that [a certain program] is a good method for people who want to quit smoking, but he wants to find more information about it before trying it out. He wants to locate this information on the Web, but he is unfamiliar with surfing the Web and has asked you to help locate this information. Because this information is very important to this family member, he has asked that you find information that is of high quality. Search through as many Web sites as necessary until you have located the site with the information you feel you can give to this family member. When you have located this site, browse through it, print the Web site, and raise your hand to notify the research assistant.

Before the specific search task, participants were given a handout containing the following instructions that directed them to locate information on nicotine gum, the nicotine patch, nicotine nasal spray, or the nicotine inhaler:

The family member/friend who wants to quit smoking has recently heard that [a certain program] is a good method for people who want to quit smoking, but he wants to find more information about it before trying it out. He wants to locate this information on the Web, but he is unfamiliar with surfing the Web and has asked you to help locate this information. Because this information is very important to this family member, he has asked that you find information that is of high quality. Search through as many Web sites as necessary until you have located the site with the information you feel you can give to this family member. When you have located this site, browse through it, print the Web site, and raise your hand to notify the research assistant.

Instrument

Three desktop computers with high-speed Internet connections running the Netscape® browser were used for conducting Web searches. As participants surfed the Web, a noninvasive tracking software (NetSnitch™) captured a log file the Web addresses of the sites visited and the time of the visits. Various precautions were utilized to ensure that all participants had the same search conditions. These included arranging for all participants to begin their search sessions at the university’s home Web page, resetting the browsers to clear the “history,” and setting the browsers not to cache documents.

Procedure

Before the search tasks, participants responded to a preliminary self-administered survey questionnaire that included measures for Internet experience, issue involvement, and demographics. Participants conducted two searches and began both searches at their university homepage. The order of the two search tasks was randomly assigned. Before each search, a handout containing instructions for the search was given and participants began the search once they acknowledged to the researcher that they understood the instructions. Upon notifying the researcher when they found the health-related site they considered to provide the best information, participants printed the Web site and then responded to a self-administered survey questionnaire that contained items assessing the perceived credibility of the Web site and the difficulty of the search. Before the beginning of the second search, the browser was reset. The same procedure for the first search was applied to the second search. Upon completing the second search, participants responded to a self-administered survey questionnaire that contained the same items that assessed the perceived credibility of the Web site and the difficulty of the search. Upon completion of the
survey questionnaire, participants were briefly interviewed about their search experience.

Participants

Eighty-four students from a major university in California (33 men and 51 women, mean age = 21.64 years) volunteered to participate in the study. In exchange for their participation, students were given a gift certificate for the university bookstore. The majority of participants (89%) were upper-division students (juniors and seniors), and 65.5% of the sample were of Caucasian descent. Research suggests that the participants in this study are similar to the broader population of Internet users who seek health-related information. With respect to searching for health-related information, undergraduates are similar to the overall online population. Specifically, 75% of online youths (ages 15–24) have sought health-related information online (Kaiser Family Foundation, 2001); that proportion is comparable to the 80% of American Web users who have used the Web to locate health-related information (Pew, 2003b). Internet users also tend to be highly educated; 37% hold undergraduate or graduate degrees and another 34% have some college education (Pew, 2003a). In addition, women are more likely to consume online health information than men (Pew, 2003b), and Caucasians constitute 71% of the online population (Pew, 2003a).

Experiment Measurement

The dependent variable is a within-subjects measure of perceived Web site credibility. Web site credibility was measured by 16 7-point Likert scale items that assessed five commonly recognized dimensions of credibility (Gaziano & McGrath, 1986; Hovland & Weiss, 1951–1952; McCroskey & Teven, 1999): expertise, goodwill, trustworthiness, depth, and fairness. Unless noted, all items in the questionnaire, including the measures of site credibility, were anchored by strongly disagree (1) and strongly agree (7). To guard against response bias, seven of the credibility items were reworded to reflect negative perceptions of the Web sites, and items were randomly ordered on the questionnaire such that no two items from the same credibility dimension appeared sequentially. The reliability coefficients of Web site credibility indexes for the two searches are similar: general search task (Cronbach’s α = .84) and specific search task (Cronbach’s α = .84). The distribution of the general search task (M = 5.85, SD = .88, range 3.25–7.00) and the specific search task (M = 5.63, SD = 6.9, range 3.67–7.00) are also similar. In addition, to test whether Web site credibility for both searches had a normal distribution, the Kolmogorov-Smirnov statistic (Field, 2000) was calculated. If the Kolmogorov-Smirnov test result is not significant, the distribution of the sample is not significantly different from a normal distribution. The test results for both search tasks were not significant: general search task (Kolmogorov-Smirnov = .09, p > .05) and specific search task (Kolmogorov-Smirnov = .06, p > .05). See Appendix A for specific wording of the items for the Web site credibility index.

Manipulation Check

To assess the difficulty of the search tasks, three measures were used. Time spent per Web page (measured in minutes) and number of pages perused for each search are common measures (Kim & Allen, 2002). In addition, the difficulty of a search was assessed with the following statement: “I had a hard time finding this Web site.”

Content Analysis Measurement

Two trained graduate students coded the Web sites chosen by participants in the two search tasks. The coding instrument (see Appendix B) assessed the presence/absence (presence = 1, absence = 0) of Web structural features and message features, which are the independent variables in this study. The structural features included domain name, third-party endorsements, privacy policy statements, site ownership, site contact information, and site navigation tools (including menus and frames). In addition, the coders visited the HON network site (www.hon.ch/HONcode/Conduct.html) to ascertain whether the health-related Web site is approved by this independent Internet endorsement organization for online health-related content.

For message features, the coding instrument assessed the presence/absence of quotations, testimonials, and statistics, all of which have been frequently studied in the message credibility literature. In addition, disclosure of authorship, referencing of sources of information, and information currency (posted dates of content modification) constituted message features (Kim et al., 1999; Silberg et al., 1997; Winker et al., 2000; Wyatt, 1997).

To determine the reliability of the data gathered from the content analysis, Krippendorff’s alpha (Krippendorff, 2003) was calculated for each of the 15 variables that constituted the Web structural features and messages features. Similarly to other statistical measures of reliability, a Krippendorff alpha value of 1 is interpreted as perfect reliability. In this study, Krippendorff’s alpha ranged from .68 to 1.0, which is within the acceptable level of reliability (Krippendorff, 2003). The mean reliability for the 15 variables was .92. That is, 92% of the data are coded to a degree of better than chance.

Independent Variables

A conceptual analysis of the literature on online credibility suggests that message attributes of a health-related Web site can be grouped as either message features or structural

2Participants were recruited from communications courses. The gender proportion in this study is similar to that of the student population for the major.
features. To determine statistically whether structural features and message features are dimensions that emerged from the 15 variables coded in the content analysis, factor analysis (principal components, with orthogonal rotation) was employed. Factor analysis determines the latent structure or dimensions of a set of variables and can be employed for dichotomous data (Kim & Mueller, 1978).

Factor analysis identified the following two factors for the general search: (1) message features (eigenvalue = 3.10, percentage of variance accounted for = 21.87) and (2) structural features (eigenvalue = 2.10, percentage of variance accounted for = 15.02). Factor analysis rendered the same two factors for the specific search: (1) structural features (eigenvalue = 2.92, percentage of variance accounted for = 20.89) and (2) message features (eigenvalue = 2.13, percentage of variance accounted for = 15.20). The only variable that did not consistently load into the same factor was domain name. Domain name did not load into either dimension for the general search task, but it loaded into the message features dimension for the specific search task. Clearly, domain name is conceptually a structural feature and an important feature of Web messages. Moreover, the factor analyses suggest that it belongs in a group by itself. This analysis is consistent with the literature on domain names and credibility in that domain name is perhaps the most salient feature of a Web site that is related to credibility perceptions. Thus, domain name is entered by itself in the regression analyses. Sites with institution-affiliated domain names (.org, .gov, .edu) were coded as 1. Commercial sites (.com, .net) were coded as 0. Finally, the presence of advertisements (e.g., banner ad, hyperlink ad, or sponsorship) was coded as 1 and absence of advertisement was coded as 0.

The composition of structural features and message features that emerged from the factor analyses is conceptually consistent with the literature on message attributes and credibility. The variable Web structural features consisted of third-party endorsements, privacy policy statements, authorship of the site, contact information, site navigation tools, and HON network site (M = 2.89, SD = 1.40 for general search; M = 2.73, SD = 1.46 for specific search). The variable message features consisted of quotations/testimonials, statistics, disclosure of authorship, referencing of sources of information, and information currency (M = 1.32, SD = 1.47 for general search; M = 1.46, SD = 1.42 for specific search).

Two audience factors were used as control variables in this study. Internet experience assessed whether participants had previously searched for health-related information; 1 indicated that they had, and 0 indicated that they had not. Issue involvement is measured by the relevance of a topic to participants. It was specifically measured in terms of whether participants were current smokers (1) or were not (0).

Data Analysis

For the manipulation check to test for differences in task specificity, paired t tests were calculated for the number of Web pages assessed and average time spent per Web page for each search task. Paired t test was also used to assess differences in the self-report measure of task difficulty.

For hypothesis testing, two separate hierarchical regression analyses were run for the two search tasks while controlling for audience factors. Stevens (1996) recommends 15 cases for each predictor in a regression model. Six predictors are used in the regression models, a number that is suitable for a sample size of 84. To control for the effects of audience factors on perceived credibility, Internet experience and issue involvement were entered in the first step, followed by the four predictor variables in the second step. The predictor variables are Web structural features, message features, domain name, and advertisements. A power analysis was conducted for F test multiple regression, with four predictors, assuming a two-tailed alpha of .05 (Erdfelder, Faul, & Buchner, 1996). The power for the general search, with an effect size of .30, was .98. The power for specific search, with an effect size of .18, was .81.

Results

Manipulation Check

Paired sample t test for the average time spent per page indicated that participants spent significantly more time per page, t(83) = 2.08, p < .05, for the general search (M = .45, SD = .27) than for the specific search (M = .38, SD = .19). Although there was not a significant difference between the number of pages assessed for each search type, t(83) = .45, p = .67, more pages were viewed on average for the general search (M = 18.77, SD = 11.26) than the specific search (M = 18.05, SD = 13.27). For participant self-assessments of the relative complexities of the respective searches, a paired sample t test indicated that the general search (M = 4.20, SD = .18) was significantly more difficult than the specific search (M = 3.15, SD = .16), t(83) = 8.12, p < .05. These results suggest that the study manipulated search task according to task specificity.

Prevalence of Structural and Message Features

Table 1 displays the descriptive statistics for the four predictor variables in both regression models. Of the Web structural features, navigation tools (menus or frames) appeared most frequently; at least one navigation tool appeared in 85.9% of sites for both search tasks. Third-party endorsements appeared least frequently; 6% and

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3The variable selection of information was excluded from the analysis because none of the Web sites coded for the specific search task had an indication that there was any type of editorial board governing the content. Eight sites (9.5% of the sample) in the general search tasks had some type of selection of information criterion. When a variable has zero variance (e.g., response is the same for all cases), SPSS does not allow for factor analysis calculation. Because selection of information was not included in the factor analysis, it was also excluded in the regression analysis that was used for hypotheses testing.
4.8% of sites had a TRUSTe or similar endorsement seal in the general and specific search tasks, respectively. Statistics was the most widely used message feature, appearing in 28.6% and 50% of sites in the general and specific search tasks, respectively. In contrast, information selection criteria is the least utilized message feature, appearing in 9.5% and 0% of sites in the general and specific search tasks, respectively. Institution-affiliated domain names appeared in 45.2% and 35.7% of sites in the general and specific search tasks, respectively. Advertisements appeared in 39.3% and 40.5% of sites from the general and specific search, respectively.

Results Related to Hypotheses

Table 2 displays the regression results for both the general and specific search tasks when controlling for audience factors. Regression analyses are significant for both the general search task, $F(5,84) = 4.34, p < .01$, and the specific search task, $F(6,84) = 2.31, p < .05$.

Hypothesis 1 stated that message features are positively associated with Web site credibility perceptions. Message features for both the general search tasks ($\alpha = .34, p < .01$) and the specific search tasks ($\alpha = .27, p < .01$) significantly predict Web site credibility perceptions. Sites with more message quality features, such as information currency and quotations, elicited higher Web site credibility perceptions. Thus, hypothesis 1 is supported.

Hypothesis 2 stated that Web structural features are positively associated with Web site credibility perceptions. Structural features did not significantly predict Web site credibility perceptions for either the general search or the specific search. Thus, hypothesis 2 is not supported.

<table>
<thead>
<tr>
<th>Variable</th>
<th>General search task</th>
<th>Specific search task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Web features</td>
<td>2.89</td>
<td>1.40</td>
</tr>
<tr>
<td>Third party endorsements</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Privacy policy</td>
<td>41.7</td>
<td></td>
</tr>
<tr>
<td>Site authorship</td>
<td>70.2</td>
<td></td>
</tr>
<tr>
<td>Site contact information</td>
<td>70.2</td>
<td></td>
</tr>
<tr>
<td>Navigation tools</td>
<td>85.7</td>
<td></td>
</tr>
<tr>
<td>HON Network</td>
<td>15.5</td>
<td></td>
</tr>
<tr>
<td>Message features</td>
<td>1.26</td>
<td>1.27</td>
</tr>
<tr>
<td>Quotation/testimonials</td>
<td>14.3</td>
<td></td>
</tr>
<tr>
<td>Statistics</td>
<td>28.6</td>
<td></td>
</tr>
<tr>
<td>Authorship of text</td>
<td>26.2</td>
<td></td>
</tr>
<tr>
<td>Reference sources</td>
<td>21.4</td>
<td></td>
</tr>
<tr>
<td>Information currency</td>
<td>26.2</td>
<td></td>
</tr>
<tr>
<td>Information selection criteria</td>
<td>9.5</td>
<td></td>
</tr>
<tr>
<td>Domain name</td>
<td>45.2</td>
<td></td>
</tr>
<tr>
<td>Advertisements</td>
<td>39.3</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Hierarchical regression analysis for variables predicting Web site credibility.

Note: General search, $R^2 = .07$ for step 1 and $\Delta R^2 = .18$; specific search, $R^2 = .50$ for step 1 and $\Delta R^2 = .10$.

*p < .01.
Hypothesis 3 posited that Web sites with institution-affiliated domain names are perceived to be more credible than Web sites with commercial domain names. Domain names was a significant predictor in only the general search task \((\alpha = .34, p < .01)\). Domain names did not significantly predict Web site credibility perceptions for the specific search task. Thus, hypothesis 3 receives only limited support.

Hypothesis 4 predicted that Web advertisements are negatively associated with Web site credibility perceptions. For both searches, the presence of advertisements did not significantly predict Web site credibility perceptions. Thus, hypothesis 4 is not supported.

The research question involved the relative influences of message features and structural features on Web site credibility perceptions when controlling for Internet experience and issue involvement. For both search tasks, message features significantly predicted Web site credibility perceptions, but structural features did not have a significant relationship. The exception was the general search task, in which message features \((\alpha = .34, p < .01)\) and domain name \((\alpha = .34, p < .01)\), a type of structural feature, both significantly predicted Web site credibility perceptions. On the basis of the standardized regression coefficients, message features and structural features contributed equally to Web site credibility.

**Discussion**

That the majority of health-related Web searches are conducted without a specific site in mind (Pew, 2002) suggests that most Web-based health information searching occurs in the absence of knowledge of the source. Rather than going to sites sponsored by established organizations such as the CDC, health-information seekers rely on search engines to locate sites. Thus, the relationship between message attributes and perceived Web site credibility is important in understanding the health-information-seeking context of the Web. Previous research suggests that in the absence of knowledge of the source, evaluation of the message predicts source credibility assessments. However, the few studies that have examined the relationship between message features and source credibility in the online context often do not distinguish between message features and structural features of a Web site.

The findings in this study suggest a disjoint. Although previous research has suggested a positive association between perceived source credibility and both message and structural features, the regression analyses in this study indicate that for both search tasks only message features significantly predict perceived Web site credibility. That is, message features were more important than structural features in determining perceived Web site credibility. The presence of quotations/testimonials, statistics, authorship, source reference, information currency, and information selection criteria in Web sites was positively associated with Web site credibility. In contrast, Web structural features did not significantly affect perceptions of site credibility. Thus, for both search tasks, the presence of third-party endorsements, privacy policy, site authorship, site contact information, site navigation tools, and HON network did not influence perceptions of Web site credibility.

One potential explanation to account for why message features were viewed to be more important than structural features in relation to perceived Web site credibility is that some of the credibility findings in the online context do not differentiate information content (Fogg et al., 2001; Rieh & Belkin, 1998). In contrast, other studies pertain to specific content such as online news (Sundar, 1998), science information (Treise et al., 2003), e-commerce (Palmer et al., 2000), and politics (Johnson & Kaye, 1998, 2000).

Although other studies do not examine message attributes like those in the current study, their findings suggest that perceived credibility may be highly contingent on content. For example, when credibility perceptions for online information are differentiated by content type, author credentials are more influential in evaluative judgments of quality and authority for medical sites than for travel sites (Rieh, 2002).

In another study that assessed overall perceived credibility but did not examine specific message attributes associated with credibility, reference-based information was perceived to be more credible than entertainment-based information (Flanagan & Metzger, 2000). Thus, credibility perceptions are contingent on content type. Because few studies have exclusively examined health-related information and no study that examined the message attributes associated with the perceived credibility of health-related Web sites could be identified, the current study relied on previous research that evaluates various types of informational content as the basis for the literature review, subsequent hypotheses, and coding categories. That structural features were not a significant predictor of perceived Web site credibility in the current study may be specific to health-related information and other information that has potentially personal consequences. A topic for future research is differentiating the correlates of credibility perceptions according to information type, including that in the areas of health, finance, and entertainment.

Although this study found message features to be a significant predictor of Web site credibility for both search tasks, the exception is domain name, a type of Web structural feature. The presence of an institution-affiliated domain name (.gov, .edu, .org) was positively associated with Web site credibility, but for only the general search. An explanation for why an institution-affiliated domain name was a significant predictor for only one search task is that the general search task is more difficult and requires more task effort than the specific search task, as demonstrated by the manipulation check. Participants spent significantly more time per page for the general search task than the specific search task, and participants also rated the general search as being more difficult than the specific task. Thus, it appears that under more difficult search conditions, participants go beyond message features in their assessment of...
credibility. They begin to rely on Web structural features, and of the various structural features, domain name is perhaps the most visible as it appears in the browser and on top of the computer screen. This characteristic suggests that there may be a hierarchy of message evaluation in which message features are evaluated first, followed by structural features. In such a hierarchy of message evaluation, message features such as disclosure of authorship and referencing of sources may be evaluated first, followed by message structures, under more difficult information search tasks. Although the data in this study cannot demonstrate such conclusions, future research should explore this posited sequence. Such a hierarchy of message evaluation may be limited to health-related information, in which the information components may be more highly scrutinized than structural features such as presence of site navigation tool. It is possible that other types of information may have a hierarchy of message evaluation in the reverse sequence with structural features having primacy.

Conclusion

The current study extends earlier research that examined the link between message evaluation and perceived credibility when the receiver has little or no source knowledge (Austin & Dong, 1994; Slater & Rouner, 1997). In this extension, this study took into account the Web context by distinguishing Web structural features from message features. Thus, by examining the individual contributions of message and structural features on perceived Web site credibility for two common search tasks, the current study begins to address the criticism that the contexts by which credibility assessments are made are often confounded. A recent review of the credibility literature (Metzger et al., 2003) noted the importance of distinguishing message and structural features in the development of the credibility literature for the online context.

The current findings, however, should be interpreted with caution for two reasons. First, the results of the current study pertain to only health-related information. Second, generalizing the results to people who are confronted with medical decisions that may require further treatment or diagnostic information should be done only with caution. Although the literature suggests that searching for health information for a family member is a common practice, there may be differences between people who search for information for themselves and those who search for information for a family member. In addition, although recent research suggests that the undergraduate participants in this study are similar to the broader population of Internet users who seek health-related information, future studies should implement more heterogeneous samples.

In addressing the influence of audience factors on credibility perceptions (Wathen & Burkell, 2002), Internet experience and issue involvement were employed as control variables in the regression analyses. Internet experience was chosen as an audience factor because of the credibility errors associated with computer experience (Fogg, 2003). However, the literature on credibility that predates the recent interest in Web credibility suggests several other audience factors that may be applicable to the online context, including motivation and prior knowledge (Wathen & Burkell, 2002). Thus, although this study controlled for audience factors most related to the online context, future studies concerned with the influence of message and structural features on perceived Web site credibility should control for other audience factors.

Another avenue for future research is to examine other categories of message attributes. The current study examined only one category—message content. In contrast, it appears that the influence of two other categories (message organization and message delivery) on perceived Web site credibility has not been extensively evaluated. The latter category, message delivery, is particularly relevant for studying credibility in the online medium because interactive components may facilitate or impede perceptions of credibility.

One reason that health-related information was the focus of this study is that many online health information seekers have little or no knowledge of the source. That message features are associated with Web site credibility perceptions suggests that the efforts of major health organizations (e.g., AMA) to promote consumer education in evaluating health-related Web sites are not futile. Many of the message features appear in the educational materials promoted by these health organizations. In addition, the presence of advertisements did not have a significant effect on Web site credibility. Although previous research found that Web advertisements resulted in negative perceptions of source credibility, these studies relied primarily on self-report questionnaires. In the current study, in which participants actively searched for health-related information and, thus, were immersed in the online medium, advertisements did not have a significant effect. Therefore, the differences in findings in the credibility research may be based on methodology. Results from studies in which participants are immersed in the online medium as they make various judgments may produce findings that are different from those studies in which participants report judgments without the real-life experience of actually navigating through the Web.

References


TABLE A1. Web Site Credibility Items for General and Specific Search Tasks.

<table>
<thead>
<tr>
<th>Fairness</th>
</tr>
</thead>
<tbody>
<tr>
<td>This site provides information that is neutral.</td>
</tr>
<tr>
<td>This site provides information that is not balanced.</td>
</tr>
<tr>
<td>This site is biased in the information it provides.</td>
</tr>
<tr>
<td>This site is slanted in the information it provides.</td>
</tr>
<tr>
<td>This site is even-handed in presenting information.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>This site does not provide in-depth information.</td>
</tr>
<tr>
<td>This site is not comprehensive.</td>
</tr>
<tr>
<td>This site offers everything you need to know on the topic.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Goodwill</th>
</tr>
</thead>
<tbody>
<tr>
<td>This site has my interests at heart</td>
</tr>
<tr>
<td>This site is uncaring about its visitors.</td>
</tr>
<tr>
<td>This site is not concerned about its visitors.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trust/expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>This site appears to have experts on the topic discussed.</td>
</tr>
<tr>
<td>This site is ethical.</td>
</tr>
<tr>
<td>This site appears to be a leader in its area of specialty.</td>
</tr>
<tr>
<td>This site is not trustworthy.</td>
</tr>
</tbody>
</table>

*Item was reverse coded.*
### Table B1: Content Analysis for Structural and Message Features

**1. Site domain name**
Is the domain name “gov” (e.g., www.cdc.gov), “.org” (ama.org), or “.edu” (www.iub.edu)?

**Site ownership**

<table>
<thead>
<tr>
<th>2. Site authorship</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the name of the organization/person running the site appear on the site? This is usually found on the top or the bottom of a Web page.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. Site contact information</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there an e-mail, telephone, or mailing address by which site visitors can contact someone affiliated with the site?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sponsorship or advertisement**

<table>
<thead>
<tr>
<th>4. Sponsorship</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the name of the organization/person “sponsoring” the site appear on the site? Other keywords to denote sponsorship include brought to you by, sponsored by, sponsor, Courtesy of. If any of these keywords appears on the site, check yes; if none of these terms appears, check no.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5. Advertisement</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there at least one advertisement on the Web site? This can be a banner ad, which appears either on the top or the bottom of the page, or any graphic image. Alternatively, it can also be a hyperlink with text suggesting the sale of a product. An advertisement would be a product or service provided in exchange for money. The product/service should not be directly associated with the site. For example, a banner ad on Nicorette on the Nicorette site would not be considered an advertisement. Advertisements should be distinct from site sponsorship. That is, if the site sponsor has a banner ad, do not include it in this variable.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Information**

For the following questions in this section (information), carefully read through all the text that provides information on a health-related topic.

<table>
<thead>
<tr>
<th>6. Information Currency</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a date that indicates when the information was last updated? This usually appears at the bottom of the page.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7. Information authorship</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there an author cited for the information provided? This can be a by line for an article, opinion, or “written by.”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8. Information reference</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there at least one citation of reference for the information provided? When a scientific/medical claim is made, is it attributed to a source that is referenced?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9. Selection of information</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there evidence that a medical board or editorial board decides what information is posted on the site? This can be a statement stating such or a link to “medical board” or “editorial board.”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10. Testimonials</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a story or account given by an individual (either anonymous or specified by name) regarding the health-related topic? A quote in the main text of the site does not constitute a testimonial. A quote that appears alone (i.e., not buried in the main text) does count as a testimonial.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11. Quotations</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does a quote regarding the health-related topic that is attributed to an individual appear in the main text of the site? The individual may be anonymous. Quotes are text found between “text text.”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(continued)
### Statistics

Are statistics regarding the health-related topic used on this site? This can be percentages, ratios, etc. However, it is *not* $.

### Third-party endorsements

13. **HON Network**

   Go to http://www.hon.ch/HONcode/Conduct.html and enter the URL of the site into the HON database. This will indicate whether the site has been accredited by the Health on the Net (HON) network.

14. **Other third-party endorsements**

   Is there an emblem/seal, notice, or other indication that the site is endorsed by a third-party organization that attests to the integrity of the site? Examples of third-party endorsements: TRUSTe, VIPPS, BBB, or related organizations.

15. **Privacy notice**

   Is there a privacy policy statement or a link to one? A privacy policy statement is a comprehensive description of a site’s practices regarding information collected. It can appear under various labels including *privacy statement*, *privacy policy*, *privacy, security, online privacy practices, our policies*, or similar labels.

### Site features

16. **Navigation**

   Is there a menu or list that serves as a directory for the Web site?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Statistics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. HON Network</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Other third-party endorsements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Privacy notice</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>