

Effect of Contact Information on the Credibility of Online Health Information

—KRIS S. FREEMAN AND JAN H. SPYRIDAKIS

Abstract—This study analyzed the effects of publisher contact information on the credibility of online health information. Participants ($n = 144$) rated the credibility of webpages with a “Contact Us” link more highly than pages that had no contact information. Other types of contact information (street addresses and email links) did not significantly affect the credibility ratings. Qualitative results indicate that the “Contact Us” link served as a peripheral cue to credibility, rather than triggering conscious analysis. This paper also discusses how the effectiveness of credibility cues can vary according to reader characteristics.

Index Terms—Credibility, Elaboration Likelihood Model, health information, information seeking.

When searching for online health information, readers must read and evaluate a vast amount of information. Most readers, however, lack the ability to judge the quality of online medical information and must instead judge its perceived quality, or its credibility. And they tend to do so very quickly. Once readers land on a webpage, they primarily use the information on that page to determine the credibility of the information there, often taking just seconds to make their judgment [1]–[15].

Many large-scale studies of credibility cues have surveyed participants about remembered or imagined webpages. For example, the Stanford Web Credibility Project had more than 4,500 people rate aspects of credibility described in questionnaires; they did not see actual webpages [16], [17]. Our past and current research is part of a growing body of work that records participants’ responses to real webpages. This approach allows the measurement of factors that can affect credibility ratings but that readers may not consciously notice.

In our earlier work, we investigated the effect of external links and publisher contact information (a street address) on the readers’ judgments of the credibility of webpages [18]. The current work expands on that theme and investigates how readers’ credibility judgments of webpages containing health information are affected by

four types of publisher contact information: (1) a “Contact Us” link; (2) an email address; (3) a high-profile street address; and (4) a low-profile street address.

After a brief examination of the theoretical framework that informs the current study, we present methods, results, discussion, and conclusions.

THEORETICAL FRAMEWORK

First, we review definitions of credibility; we then examine research that has assessed what cues and reader characteristics affect credibility judgments and ways of measuring credibility.

Definitions of Credibility Many credibility researchers define credibility as a perception of trustworthiness that may be distinct from the actual quality of the thing being evaluated [19]–[22]. According to credibility researcher B. J. Fogg, credibility is a “perceived quality” that “doesn’t reside in an object, a person, or a piece of information” [22, p. 80]. Hovland, Janis, and Kelley define credibility as having two key components: (1) expertise and (2) trustworthiness [23]. Hovland defines expertise in terms of skills and competence; he states that readers base judgments of expertise on whether they believe a source to be “well informed and intelligent” and “capable of transmitting valid statements” [24, p. 21]. He defines trustworthiness in terms of motivation and intent toward the reader, what other researchers have referred to as “benevolence” [25]. Trustworthiness has also been defined as having a component of reliability [25].

An information source may be trustworthy, but lack expertise, or vice-versa. Consider the example of an individual who has been referred to a specialist for possible surgery. If the surgeon

Manuscript received March 10, 2008; revised July 13, 2008.

Current version published May 20, 2009.

K. S. Freeman is with the College of Forest Resources, University of Washington, Seattle, WA 98195-2100 USA (email: kfreeman@u.washington.edu).

J. H. Spyridakis is with the Department of Human Centered Design and Engineering, University of Washington, Seattle, WA 98195-7920 USA (email: jansp@u.washington.edu).

Color versions of one or more of the figures in this paper are available online at <http://ieeexplore.ieee.org>.

IEEE 10.1109/TPC.2009.2017992

seems to reflexively recommend surgery without carefully examining the patient or explaining less invasive options, the patient might decide that the surgeon, despite his or her expertise, is less than trustworthy. An example of trustworthiness without expertise might be a close friend without a medical background who passes on secondhand and perhaps less-than-reliable advice about alternatives to surgery.

Many factors that affect judgments of credibility can be categorized as components of trustworthiness and expertise. For example, honesty and accountability can be categorized as components of trustworthiness, and accuracy and completeness can be categorized as components of expertise. A third key trait is that of dynamism [21], [26], [27]. Studies of this trait, which have often attempted to measure the attractiveness or persuasiveness of a live or televised speaker, draw on theories from speech and interpersonal communication.

Beyond the specific definitions of credibility is the consideration of how much thought readers give to judging credibility. In the context of online health information, people do not always carefully evaluate all of the information they encounter; they simply do not have the time or ability to do so. Instead, they often use a variety of cues or mental shortcuts to determine information quality. This approach is well explained by the Elaboration Likelihood Model (ELM), which provides a useful theoretical framework for understanding how cues, such as the presence of contact information on a webpage, affect credibility judgments [28]. According to ELM, readers tend to judge text credibility either by carefully evaluating arguments in text (the "central route") or by leaning on external cues (the "peripheral route") that allow the reader to make simple judgments about the merits of a given argument without attending to the argument itself [28, p. 3]. Peripheral cues can be features, such as the type of publication in which a text appears or author affiliations, for example.

A variety of factors influences the readers' use of the central versus peripheral route to judging text credibility [28]. Readers are more likely to use central processing when they (1) believe an argument or information has personal relevance, as in the case of a health issue affecting a family member; (2) are knowledgeable about a given topic; (3) are motivated, for example, if they must make a decision about a medical treatment; or (4) are able to process the information in a message, for example, if their literacy level matches that of the

information being processed. In contrast, readers depend more on peripheral cues to judge credibility as their motivation or ability to process arguments decreases, or when they are rushed for time or overwhelmed with information.

Cues to Credibility Two types of credibility cues are relevant to the current work: 1) source characteristics and 2) contact information.

Source Characteristics: The credibility of an information source is one of the most powerful factors affecting information credibility. For example, readers are more likely to trust news stories from a source they perceive to be credible [29], [30] and tend to trust health information published or authored by physicians or major health institutions [2], [11], [31]–[41]. The concept of the source as a cue to credibility can be parsed into four levels: (1) publishers (i.e., the owners or sponsors of a website); (2) authors (i.e., the writers who collect and analyze information); (3) originators of information (i.e., the sources of information cited in an article, such as scientists or physicians quoted in news stories); and (4) communication channel or technology (i.e., the means by which information is transmitted, such as television or the internet) [42].

A lack of source information can also be used as a cue to credibility. In one study, 42% of the participants reported rejecting a health website "because they couldn't determine the source of the information" [5, p. 6]. Some readers may rely on general, peripheral cues to the medical expertise of sources, such as sponsorship of a site by a hospital or authorship by a person using a professional title such as "Doctor." However, since reader demographics and individual circumstances affect the specific health institutions that readers trust [2], [35], [41], [43], [44], some readers may use central processing to analyze health information sources more carefully.

Not all readers are affected by source information or the lack thereof. In one study, the presence or absence of information about the sponsor of a webpage had no significant impact on participants' ratings of the health information on the page [45].

Contact Information: Contact information is another cue that readers may use to evaluate the credibility of a webpage. Contact information presumably affects readers' judgments of the credibility of a webpage by affecting judgments of the credibility of the information source at the level of publisher. Several surveys have found that when

readers contemplate an imagined or remembered webpage, they state that the presence of a “physical” (non-email) address and phone number can increase the credibility of information [16], [46]. Similar results have occurred when readers rate the credibility of actual websites [17]. Our previous research also found that the presence or absence of a street address affected credibility ratings by readers who read a webpage on a medical topic [18]. These studies did not investigate the reasons why the presence of contact information increased credibility ratings. However, it is not unreasonable to speculate that readers may be more likely to trust a source that indicates a willingness to be contacted to provide assistance, handle complaints, or receive criticism. In contrast, another study found that when users searched for online health information with the goal of finding credible pages to recommend to others, the presence of contact information (email, telephone, or mailing address) did not affect site selection [47].

Our earlier work [18] revealed that credibility judgments involve complex interactions, a finding supported by the work of Walther, Wang, and Loh [48]. We found that when participants read a medical article online and then rated the credibility of the web article, they tended to rate it more highly if sponsor information on the webpage included a street address. However, when asked to rate the credibility of the author of the article, the presence of a street address tended to decrease credibility ratings. An interaction among three factors may have led to this result. First, the brief medical article was written for the general reader, and our participants rated it as easy. Second, the fictional address on the experimental webpage was crafted to appear to belong to an established health institution. Third, the fact that readers were asked to evaluate the author’s credibility and, by implication, the author’s competence, about the unnamed author of the article may have triggered central processing, which can make readers more critical. This inference is supported by the fact that numerous participant comments discussed the importance of author credentials in evaluations of article credibility. During this more critical processing, the credibility of the author of an easy article may have suffered in contrast to a putative institutional source who some participants may have thought should provide more detailed and technical information.

Reader Characteristics and Credibility

Judgments Credibility judgments are also affected by characteristics of those judging credibility. A

primary factor influencing the use of central versus peripheral processing is the competence of readers to understand or evaluate information. According to ELM, readers are more likely to use central processing if they have knowledge of the subject discussed. This was the case in one study in which physicians, using central processing, evaluated a set of webpages more critically than did people with AIDS [11]. Readers are also more likely to use central processing if they find information easy to comprehend or if they have a personal connection to the information. For example, people with a chronic health condition or who have recently been diagnosed with a serious illness are likely to seek information that is personally relevant and are motivated to find accurate sources [2], [5], [49]–[53], thus increasing their motivation to use central processing. In one study where participants had deep personal interest in the content of the pages being evaluated, the participants examined sites carefully and were “quick to notice website sponsorship (even if buried in the small print), currency (how up to date the information was), any information biases, cultural differences or inconsistencies” [50, p. 668]. However, it should not be assumed that readers will always analyze information of personal relevance more critically than information of less personal import. In a recent study, readers who rated an online health article more highly for personal relevance, interest, and importance also tended to give the article higher ratings on credibility measures [54].

In contrast, readers who are relatively healthy and conduct casual searches for information on topics such as weight loss and fitness are more likely to use peripheral processing. For example, many readers tend to trust sites displayed by their favorite search engine [3]. In addition, 62% of health-information seekers interviewed by the Pew Internet & American Life Project report looking at three or fewer sites, and only 15% report always checking the source and date of health information, less than the percentage who report reading food labels [3].

Of course, many readers seek information for people other than themselves, so their motivation does not directly relate to their own health status [5], [31], [32], [49], [53]. The implicit assumption of studies about this population is that people are more likely to pass on information that they believe to be credible. Few studies have made this assumption explicitly and used the willingness to recommend information to others as a measure of credibility [18], [47].

Studies have also found relationships between internet experience, age, gender, and credibility. Experienced internet users view online information to be more credible than less experienced users [1], [13], [55], [56]. Young users tend to trust online information more than older users, especially people over 65 [1], [55], [57]. Of course, younger users may have more internet experience than older users. And one study found that males rated the credibility of websites more highly than females, especially sites ostensibly authored by females [58].

Measuring Credibility Many studies of health information have measured the qualities of credibility by assessing trustworthiness and expertise as defined by Hovland and colleagues [23] and later refined and validated by Gaziano and McGrath [59] and West [60]. One widely cited study consists of five credibility components (fairness, bias, depth of reporting, accuracy, and trustworthiness) [61]. A variety of adjectives is used to describe credibility and aspects of credibility, including “expertise,” “trustworthiness,” and “credible,” itself. Since trustworthiness and expertise are the two key aspects of credibility, we refer to them as primary components of credibility. Other terms used to describe credibility can be categorized as aspects of trustworthiness and expertise. For example, terms such as “believable,” “objective,” “fair,” “unbiased,” and “truthful,” can be categorized under trustworthiness. We refer to these terms as secondary components of credibility. We also categorize terms, such as “accurate,” “complete,” and “competent,” under expertise. Finally, credibility has been assessed by asking participants about possible future actions based on the information, and by asking participants if they would recommend the information to a friend or relative [18], [47].

Hypotheses The population chosen for this study (engineering students) and the study website topic (diabetes) led us to anticipate that participants would use peripheral processing in making their credibility judgments. Although our participants would have the ample ability to evaluate the information presented in the study and use central processing, we predicted that their motivation to do so would be relatively low.

The literature reviewed here specifically led us to the following hypotheses concerning participants’ ratings of credibility of webpages that have different types of contact information:

H1. Credibility ratings will be influenced by

- participants’ familiarity with, interest in, and perceptions of difficulty of the information in test articles;
 - participants’ experience or employment in a medical setting;
 - participants’ willingness to recommend or use the information in an article.
- H2.** Credibility ratings will be higher with
- web articles that include contact information;
 - web articles that include contact information specifically indicating a physical presence (street address) and, in particular, a high-profile physical presence.

METHODS

Participants Participants were recruited from 12 undergraduate technical communication classes in the Department of Technical Communication (now the Department of Human Centered Design and Engineering), College of Engineering, at the University of Washington. Of the 188 participants who participated in the study, 144 (76.6%) were native English speakers; the rest were not. *T*-tests for the effect of native language (native, non-native English speakers) on many demographic and credibility measures revealed significant differences between these two groups; hence, only native English speakers were included in further analyses. Of the native English speakers, 72.2% were males ($n = 104$). The average age of participants who were native speakers of English was 21 years ($SD = 1.996$).

Materials for Experimental Conditions The experimental materials consisted of a one-page web article on diabetes, instructional pages, and a questionnaire.

Experimental Web Article and Contact

Information The one-page web article contained article text, a logo, and contact information. As will be described, only the contact information varied among the experimental conditions. The article text was excerpted from the website of the Centers for Disease Control and Prevention (CDC) and covered basic information about the prevention and treatment of diabetes in a question-and-answer format [62]. To minimize effects on credibility, we removed all references, sources, and the byline. The article was edited to 407 words and had a Flesch–Kincaid reading level of 9.3. The name and logo of a fictitious health organization (National Health Organization) were placed on the upper

left-hand corner of each page. Contact information was located directly below the logo. (See Fig. 1.)

By varying the presence or absence and the type of contact information, we created five experimental conditions that were administered as a one-way, between-subjects design:

- no contact information;
- a “Contact Us” link;
- an email address (Info@nationalhealth.org);
- a high-profile street address and phone number (in Washington, DC) (see Fig. 1);
- a low-profile street address and phone number (in Bismarck, ND).

The “Contact Us” link was not functional; participants who clicked on this link would encounter a message stating that the link was nonfunctional for the purposes of the study. The high-profile Washington, DC, address was selected for the possibility that it might confer credibility to online health information beyond the mere presence of a physical address. The low-profile North Dakota address was selected to add little or no credibility beyond the simple presence of an address. The street addresses and phone numbers used for the high- and low-profile addresses were fictitious, but they were similar to those of existing government agencies.

Instructional Pages The welcome page for the study contained human subjects consent information and told participants that their name would not be linked to study data in any way, and that they could withdraw from the study at any time. At the bottom of the page was an active link titled “Continue to experiment” that led to one of the experimental webpages, which, in turn, linked to the questionnaire. The questionnaire linked to a page where participants could enter their name to receive class credit. To ensure confidentiality, the databases for class credit and experimental results were not linked. Finally, the class credit page was linked to a thank-you page.

Questionnaire The questionnaire asked participants to provide some demographic information, rate aspects of the credibility of the website they read on diabetes, and answer some open-ended questions. The questionnaire pages were developed using WebQ software, developed by the Catalyst Project at the University of Washington [63]. The questionnaire asked participants to rate their familiarity with the information in the article, their interest in the article, and their difficulty reading the article and to provide standard

demographic data such as age, gender, and internet use. Questions about internet use were adapted from GVU surveys [64].

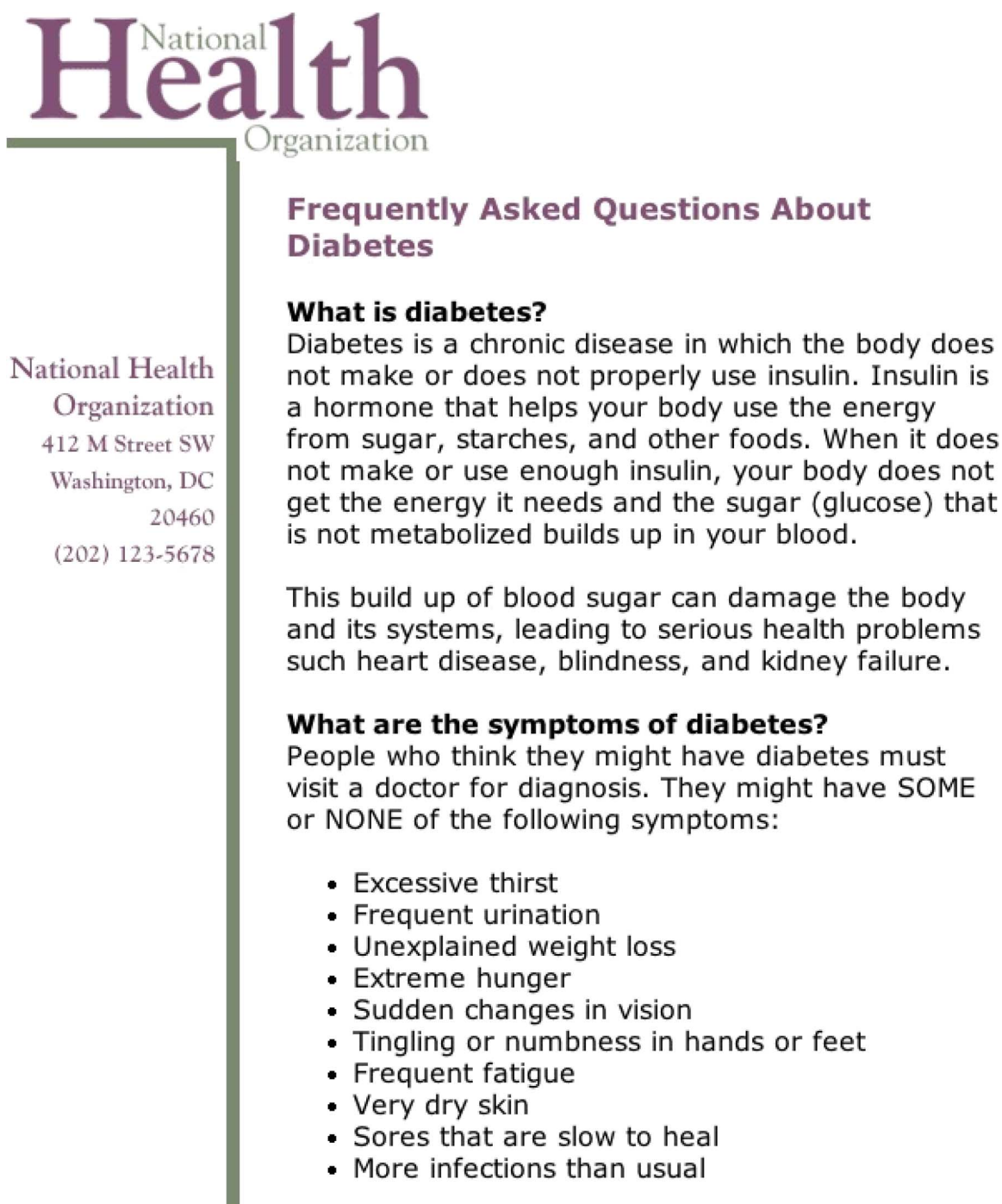
Fourteen questions asked participants to rate the credibility of the website they read by responding to a five-point Likert-type scale to statements about the credibility of the article they had just read and about the author of the article. The questions directly addressed credibility at three levels: (1) credibility itself; (2) primary components of credibility (expertise and trustworthiness); and (3) secondary components of credibility (accuracy and completeness, which are components of expertise, and fairness and bias, which are components of trustworthiness). In the survey, the questions were presented in alphabetical order. (See Fig. 2.)

Participants were then asked to rate their willingness (1) to recommend the article to someone who had or was at risk of getting diabetes and (2) to use the information in the articles themselves.

Participants next rated the credibility of some hypothetical designs of web health articles that varied by factors related to authorship: no author named, author identified by name but without medical credentials, or author identified by name and with medical credentials. This one part of the study constituted a within-subjects design.

The first of three open-ended, qualitative questions asked participants to list some words they might use to describe the quality of the article they had read in the experimental materials. The other two questions concerned imagined or remembered webpages and asked participants to state what characteristics of a website would most influence their decision to use the information found on the website and to describe how they would decide which articles to believe when articles presented conflicting information.

Overall Procedure The experimental materials and the questionnaire were pilot tested as part of a previous study [18]. Participants accessed the online experimental website using a URL provided by their instructors. They then read the general instructions for the experiment and selected the “Continue to experiment” link. At that point, one of the five versions of the experimental webpage was randomly assigned to the participant and opened in the browser. After reading the page, participants progressed to the questionnaire, the screen for signing up to receive class credit, and the final thank-you screen.



National Health Organization
412 M Street SW
Washington, DC
20460
(202) 123-5678

Frequently Asked Questions About Diabetes

What is diabetes?

Diabetes is a chronic disease in which the body does not make or does not properly use insulin. Insulin is a hormone that helps your body use the energy from sugar, starches, and other foods. When it does not make or use enough insulin, your body does not get the energy it needs and the sugar (glucose) that is not metabolized builds up in your blood.

This build up of blood sugar can damage the body and its systems, leading to serious health problems such heart disease, blindness, and kidney failure.

What are the symptoms of diabetes?

People who think they might have diabetes must visit a doctor for diagnosis. They might have SOME or NONE of the following symptoms:

- Excessive thirst
- Frequent urination
- Unexplained weight loss
- Extreme hunger
- Sudden changes in vision
- Tingling or numbness in hands or feet
- Frequent fatigue
- Very dry skin
- Sores that are slow to heal
- More infections than usual

Fig. 1. Upper portion of the web article on diabetes. This screen shot shows the fictitious National Health Organization's logo and high-profile street address.

Data Analysis Quantitative results were analyzed in SPSS 11.5. Qualitative data were analyzed by using ATLAS.ti 5.0. Intercoder reliability was calculated using Program for Reliability Assessment with Multiple Coders (PRAM) 0.4.5 from Skymeg Software [65]. Unless otherwise stated, the alpha level was set at 0.05.

RESULTS

Demographics and Knowledge of/Interest in the Web Article Demographic results and participants' knowledge and perceptions of the content of the article are reported first because they influence the credibility ratings. Participants (native

Please indicate your level of agreement with the following statements about the article you just read.

The ARTICLE is:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Accurate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Biased	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Credible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trustworthy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The AUTHOR of the article is:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Accurate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Biased	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Credible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trustworthy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Fig. 2. Screenshot of survey credibility questions.

TABLE I
INTERNET USE AND PERCEPTIONS OF ARTICLE FAMILIARITY, INTEREST, AND DIFFICULTY (PERCENT OF FREQUENCY)

Use of the Internet to Look Up General Information				
Never 0.0	A few times a year 6.3	About once a month 7.6	About once a week 20.1	More than once a week 66.0
Use of the Internet to Look Up Medical Information				
Never 20.1	A few times a year 56.9	About once a month 18.1	About once a week 3.5	More than once a week 1.4
Familiarity with Topic				
Very unfamiliar 5.6	Unfamiliar 25.2	Neutral 25.2	Familiar 35.6	Very familiar 8.4
Interest in Article Read				
Very uninteresting 0.0	Uninteresting 14.6	Neutral 31.9	Interesting 48.6	Very Interesting 4.9
Perceptions of Difficulty of Article				
Very difficult 0.0	Difficult 0.0	Neutral 6.3	Easy 58.3	Very easy 35.4

English speakers) were active users of the internet; nearly two-thirds (62.5%) reported engaging in six or more of the eight listed internet/web activities, and approximately three-quarters (72.0%) reported engaging in four or more of the five listed internet/web actions. The majority (66.0%) reported using the internet to look up general information more than once a week, but most looked up medical information online far less frequently (see Table I); furthermore, only 10% reported working in a health or medical field, primarily as volunteers or in administration (e.g.,

program assistant, website developer). A majority had a friend or relative who had diabetes (61.8%).

Participants' familiarity with the topic discussed in the web article varied widely, with 30.8% rating it as very unfamiliar or unfamiliar and 44.0% rating it as familiar or very familiar. (See Table I.) Just over half (53.5%) rated the article as interesting or very interesting. Almost all (93.7%) rated the article as easy or very easy to understand.

Credibility Assessments Analyses of variance (ANOVAs) were run to assess the effect of the

TABLE II
EFFECT OF PRESENCE OR ABSENCE OF CONTACT INFORMATION ON CREDIBILITY RATINGS

Credibility Measure	Means (SD)					ANOVA	
	No Contact	Contact Us	Washington D.C. Address	North Dakota Address	Email Only	F-value	p-value
Article							
is credible	3.76 (0.689)	3.96 (0.898)	3.82 (0.557)	4.03 (0.556)	3.67 (0.679)	(4, 138) = 1.352	0.254
is expert	2.52 (0.785)	3.28 (0.976)	3.07 (0.813)	3.03 (0.850)	3.19 (0.736)	(4, 137) = 3.615	0.008*
is accurate	3.86 (0.581)	4.15 (0.534)	3.71 (0.535)	4.00 (0.516)	4.04 (0.508)	(4, 138) = 2.725	0.032
provides compl. info.	2.79 (0.902)	3.18 (1.188)	3.18 (0.819)	3.10 (0.746)	2.93 (0.813)	(4, 139) = 1.006	0.407
is trustworthy	3.52 (0.785)	3.96 (0.649)	3.82 (0.548)	3.87 (0.562)	3.68 (0.612)	(4, 138) = 2.149	0.078
is biased	2.14 (0.516)	1.89 (0.751)	2.29 (0.535)	2.03 (0.765)	2.11 (0.892)	(4, 136) = 1.179	0.323
is fair	3.72 (0.751)	4.15 (0.602)	3.86 (0.525)	4.03 (0.421)	3.89 (0.506)	(4, 135) = 2.306	0.061
Author							
is credible	3.38 (0.728)	3.96 (0.576)	3.57 (0.634)	3.77 (0.617)	3.54 (0.693)	(4, 139) = 3.476	0.010*
is expert	2.93 (0.753)	3.37 (0.926)	3.14 (0.591)	3.16 (0.860)	3.15 (0.718)	(4, 137) = 1.114	0.352
is accurate	3.72 (0.591)	4.00 (0.620)	3.61 (0.567)	3.94 (0.574)	3.78 (0.506)	(4, 137) = 2.174	0.075
provides compl. info.	2.86 (0.970)	3.18 (1.020)	3.11 (0.641)	3.20 (0.925)	3.07 (0.766)	(4, 136) = 0.687	0.602
is trustworthy	3.32 (0.772)	3.96 (0.437)	3.54 (0.508)	3.63 (0.615)	3.61 (0.567)	(4, 136) = 4.183	0.003*
is biased	2.38 (0.561)	2.15 (0.864)	2.36 (0.488)	2.45 (0.888)	2.26 (0.813)	(4, 137) = 0.713	0.584
is fair	3.62 (0.561)	4.04 (0.518)	3.71 (0.600)	3.87 (0.562)	3.74 (0.526)	(4, 137) = 2.358	0.057

Note: In the survey, the credibility questions were presented in alphabetical order (See Fig. 2.) Here the results are presented in the theoretical order, as described in the methods section.

*A Bonferroni correction was applied; analyses were deemed significant if $p \leq 0.011308$.

contact information on the credibility ratings. Due to the large number of dependent variables being analyzed, a Bonferroni correction was applied and analyses were deemed significant if the p -value was equal to or less than 0.011308.

The ANOVAs that assessed the effects of contact information on seven measures of article credibility revealed a significant effect for article expertise ($p = 0.008$) with marginal significance on article accuracy ($p = 0.032$). (See Table II.) Post-hoc Scheffé tests ($p = 0.05$) for article expertise showed that the article that contained a “Contact Us” link had significantly higher ratings than the article without contact information. With regard to article accuracy, the article with a “Contact Us” link had higher ratings than the article with the Washington, DC, address.

The ANOVAs that assessed the effects of contact information on seven measures of author credibility revealed significant effects on “author is credible” ($p = 0.01$) and “author is trustworthy” ($p = 0.003$). Post-hoc Scheffé tests ($p = 0.05$) revealed that the article that contained a “Contact Us” link received significantly higher ratings for author credibility and trustworthiness than the article without contact information.

TABLE III
EFFECT OF PARTICIPANT GENDER ON CREDIBILITY RATINGS

Article	Means (SD)		t-test	
	Males	Females	t-value	p-value
is accurate	4.02 (0.524)	3.76 (0.524)	$t(139) = 2.646$	0.013
provides complete info.	3.15 (0.890)	2.71 (0.890)	$t(140) = 2.646$	0.009

Note: 1 = low; 5 = high.

ANOVAs did not reveal any significant effects of contact information on participants’ willingness to (1) recommend that someone who had or was at risk of contracting diabetes read the article or (2) use the information in the article themselves.

T-tests on the effect of gender on credibility ratings revealed that male participants gave significantly higher ratings than female participants to two credibility factors: (1) “article is accurate” and (2) “article contains complete information” (see Table III), a result in keeping with previous literature [64].

Participants’ Willingness to Use the Article and Recommend It Participants stated that they were willing to use the information in the article ($M = 3.14, SD = 1.062$) and to recommend the

information in it to others ($M = 3.42$, $SD = 0.950$). Further, many correlations among these views and participants' perceptions of the article were significantly correlated: Participants who were more interested in the article and familiar with it were significantly more willing to use its information ($p = 0.007$ and 0.013 , respectively). Participants who were more interested in the article were also significantly more willing to recommend it ($p = 0.008$). Yet, participants who saw the author as biased were significantly less willing to use it ($p = 0.05$) or recommend it ($p = 0.009$). (See Tables IV and V.)

As expected, ratings for familiarity, interest, and difficulty of the information in the article also significantly correlated with many credibility measures. Participants who were significantly more interested in the article rated the author higher in terms of fairness ($p = 0.02$) and provided complete information ($p = 0.02$). Participants who were more familiar with the information rated the article significantly higher on accuracy ($p \leq 0.001$), credibility ($p = 0.04$), and trustworthiness ($p = 0.02$), and the author was rated significantly higher on accuracy ($p \leq 0.001$) and credibility ($p = 0.002$). Participants' ratings for difficulty inversely correlated with judgments of article completeness ($p = 0.046$); participants who rated the article as easier rated the article to be significantly lower in terms of it providing complete information. (See Tables IV and V.)

Effect of Authorship on Ratings for Hypothetical Webpages In addition to the ratings of the webpages that participants actually saw and read, participants rated three hypothetical webpage designs with regard to credibility features related to authorship—no author named, author identified by name but without medical credentials, or author identified by name and with medical (MD) credentials. Two within-subjects ANOVAs were significant for expertise ($F(2, 140) = 299.957$, $p \leq 0.001$) and believability ($F(2, 140) = 255.763$, $p \leq 0.001$). Post-hoc, paired-sample t -tests revealed that hypothetical articles with a named author with MD credentials had significantly higher ratings than articles with a named author without medical credentials for expertise ($t(140) = 20.193$, $p \leq 0.001$) and believability ($t(142) = 17.783$, $p \leq 0.001$). (See Table VI.) In turn, hypothetical articles with a named author without medical credentials received significantly higher ratings than articles without a named author for expertise ($t(141) = 8.597$, $p \leq 0.001$) and believability ($t(142) = 7.558$, $p \leq 0.001$).

TABLE IV
CORRELATIONS AMONG FAMILIARITY, INTEREST, AND WILLINGNESS TO USE OR RECOMMEND INFORMATION IN ARTICLE (r -VALUE)

	Willingness to Use Information	Willingness to Recommend Information	Familiarity	Interest
Willingness to Use Information				
Willingness to Recommend Information	0.603*** $n = 141$			
Familiarity	0.208* $n = 143$	0.072 $n = 140$		
Interest	0.224** $n = 144$	0.223** $n = 141$	0.017 $n = 143$	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Open-Ended Comments about Experimental Webpages Participants responded to three open-ended questions that asked them to (1) list some words they might use to describe the quality of the article they read; (2) state what characteristics of a website would most influence their decision to use health information they found on an online health information site; and (3) state how they would decide which article to believe if two web articles presented conflicting information. As with the quantitative analyses, non-native speakers of English were excluded from qualitative analysis of all comments offered in response to open-ended questions. Two independent judges coded 10% of the responses. Intercoder reliability, measured by Cohen's Kappa, ranged from 0.0767 to 1.000 with an average of 0.81. The remaining responses were coded by one evaluator.

Comments Regarding Quality of the Article Read

The majority of participant comments regarding the quality of the experimental article agreed with or did not contradict the quantitative ratings regarding the article's perceived difficulty and participants' interest in the article and familiarity with the material presented. Participants reported no difficulty in comprehending the article and some described the ease of the articles in negative terms, such as "simplistic" and "junior-high-like." Few comments addressed interest in or familiarity with the information. Comments regarding

TABLE V
CORRELATIONS AMONG CREDIBILITY RATINGS, FAMILIARITY, INTEREST, DIFFICULTY, AND WILLINGNESS TO USE OR RECOMMEND INFORMATION (*r*-VALUE)

Credibility Measure	Willingness to Use Information	Willingness to Recommend Information	Familiarity	Interest	Difficulty
Article					
is accurate	0.218** <i>n</i> = 143	0.239** <i>n</i> = 140	0.351** <i>n</i> = 142	0.098 <i>n</i> = 143	-0.021 <i>n</i> = 143
is biased	-0.068 <i>n</i> = 141	-0.188* <i>n</i> = 138	-0.076 <i>n</i> = 140	-0.074 <i>n</i> = 141	-0.031 <i>n</i> = 141
is expert	0.184* <i>n</i> = 142	0.285** <i>n</i> = 139	0.028 <i>n</i> = 141	0.104 <i>n</i> = 142	0.048 <i>n</i> = 142
is credible	0.303** <i>n</i> = 140	0.363** <i>n</i> = 137	0.177* <i>n</i> = 139	0.019 <i>n</i> = 140	-0.051 <i>n</i> = 140
is fair	0.135 <i>n</i> = 140	0.265** <i>n</i> = 137	0.161 <i>n</i> = 139	0.038 <i>n</i> = 140	0.062 <i>n</i> = 140
is trustworthy	0.306** <i>n</i> = 143	0.336** <i>n</i> = 140	0.200* <i>n</i> = 142	0.116 <i>n</i> = 143	0.032 <i>n</i> = 143
provides complete info.	0.381** <i>n</i> = 144	0.340** <i>n</i> = 141	0.088 <i>n</i> = 143	0.095 <i>n</i> = 144	-0.167* <i>n</i> = 144
Author					
is accurate	0.167* <i>n</i> = 142	0.252 <i>n</i> = 139	0.358** <i>n</i> = 141	0.057 <i>n</i> = 142	0.084 <i>n</i> = 142
is biased	-0.050* <i>n</i> = 142	-0.082* <i>n</i> = 139	-0.047 <i>n</i> = 141	-0.037 <i>n</i> = 142	0.040 <i>n</i> = 142
is expert	0.300** <i>n</i> = 142	0.316** <i>n</i> = 139	0.126 <i>n</i> = 141	0.123 <i>n</i> = 142	0.44 <i>n</i> = 142
is credible	0.245** <i>n</i> = 144	0.299** <i>n</i> = 141	0.255** <i>n</i> = 143	0.147 <i>n</i> = 144	0.034 <i>n</i> = 144
is fair	0.116 <i>n</i> = 142	0.162 <i>n</i> = 139	0.101 <i>n</i> = 141	0.198* <i>n</i> = 142	0.099 <i>n</i> = 142
is trustworthy	0.319** <i>n</i> = 141	0.388** <i>n</i> = 138	0.144 <i>n</i> = 140	0.123 <i>n</i> = 141	0.047 <i>n</i> = 141
provides complete info.	0.288** <i>n</i> = 141	0.365** <i>n</i> = 138	0.119 <i>n</i> = 140	0.200* <i>n</i> = 141	-0.148 <i>n</i> = 141

p* < .05; *p* < .01; ****p* < .001

credibility were even more scarce; only two participant comments (1.4%) explicitly described the experimental article as “credible,” three comments (2.1%) described it as “accurate,” and one comment (0.7%) described it as “trustworthy.”

No comments mentioned contact information.

Comments Regarding Online Health Information in General Participants also commented on factors that would influence their decision to use health information on a remembered or imaginary webpage, with the credibility of the source of

TABLE VI
RATINGS OF EXPERTISE AND BELIEVABILITY FOR HYPOTHETICAL WEBSITE DESIGNS

Credibility Measure	Means (<i>SD</i>)		
	No author named	Author named	Author named and MD credentials
Expertise	1.99 (0.828)	2.59 (0.698)	3.84 (0.743)
Believability	2.44 (0.863)	2.88 (0.776)	3.89 (0.769)

information as the most frequently mentioned factor. Ninety-two comments (65%) discussed the need for overall credibility or the desire for source credibility at the level of publisher, author, or supporting materials. Thirty-nine of the comments that discussed credibility specified the desire for official medical sources of information, such as a “credible health organization or a health sciences school” (42.3% of comments that discussed a desire for credibility, 27.6% of total comments).

Regarding article difficulty, only seven comments stated a preference for information that was easy to read, and one comment expressed the distrust of medical information that was simplistic (“I don’t want to feel like the article is dumbing down information that could directly impact my health”).

Two comments (1.4%) mentioned the presence of contact information as a factor in a decision to use information from a website.

Comments Regarding Articles Providing Conflicting Information Source credibility was also reported as a deciding factor when dealing with remembered or imaginary websites that presented conflicting information. Of the 67 comments (45.6%) that discussed the importance of source credibility, 14 comments stated that the presence of medical sources of information would be a deciding factor in the participants’ decision (9.7% of total comments, 20.8% of those discussing the importance of credibility). Many participants also reported that, if faced with two sites that presented conflicting information, they would continue their research through further perusal of print or

online materials or discussions with a health-care professional.

One comment mentioned the presence of contact information as a way to determine which of two conflicting sites to use.

DISCUSSION

The participants in this study were typical internet users: They used the internet to search for general information more frequently than they used it to search for medical information. Further, few participants were employed in medical fields, and most were not highly familiar with the article on diabetes. However, given that the participants were engineering students, they were less typical of the general population in that they had more training in the physical sciences, were 21 years old on average, and were mostly male (72.2%). But we must point out that they were very representative of their age group in being active users of the internet, and they represent valid users who might process factual information using peripheral processing.

In fact, the results indicate that all participants had the ability to use central processing to evaluate the articles but, due to their lack of motivation to do so, were quite likely to use peripheral processing. Results for ratings of article difficulty (which relate to the ability to use central processing), and interest and familiarity (both of which relate to motivation) indicate that participants demonstrated that they had no difficulty comprehending the content in the experimental article (and indeed, some disdain for the easiness of the article), mild interest in the content, and little familiarity with it. The participants' likely desire to complete the study quickly and their knowledge that the article was part of an academic study may also have contributed to their likelihood to use peripheral processing. As younger readers, these participants might be expected to view online information less critically than older readers and so perhaps to engage in more peripheral processing of the information in the article than older readers. However, as engineering students trained in critical thinking, these participants might process some types of information more critically than the average reader and may be more likely to engage in central processing. Therefore, we cannot necessarily assume that in this study participant age affected the use of peripheral versus central processing.

Regarding participants' credibility judgments, as hypothesized, most participants found source

credibility to be a critical factor in their decision to use online health information. Articles with "Contact Us" links were deemed significantly more expert than articles without such a link, and authors of articles with a "Contact Us" link were ranked as significantly more credible and trustworthy than authors of articles without such a link. In contrast, no effect was found for pages with a street address and phone number. Furthermore, at a level of marginal significance, the pages with the "Contact Us" link were rated more highly than the pages with only the Washington, DC, address. These results consistently related to higher ratings for pages with a "Contact Us" link versus pages without contact information. Therefore, the hypothesis regarding physical address was not supported.

Although the quantitative results indicate that a "Contact Us" link served as a cue to credibility for a majority of participants, the qualitative results indicate that the vast majority of participants did not consciously consider contact information as an important factor in their decision to use online health information. This would tend to indicate that the presence or absence of contact information, specifically a "Contact Us" link, served as a cue to peripheral rather than central processing.

As hypothesized, participants' familiarity with, interest in, and perceptions of difficulty of the article also affected credibility ratings, though to a lesser extent than contact information. Participants who were significantly more interested in and familiar with the content rated the article and author higher on several credibility measures. Perceptions of article difficulty correlated with lower ratings on one credibility measure. As expected, there were a number of significant, positive correlations between the credibility ratings and participants' reported willingness to use or recommend the information in the article.

Other Credibility Factors: Expertise, Supporting Information, and Author Credentials Analyses that investigated other issues related to credibility were informative. Qualitative results indicated that some participants equated text difficulty with article expertise. Several comments revealed disdain for the easy reading level of the experimental article; further, a typical answer to the question about the hypothetical articles that would contain conflicting information stated that the participant would select the article "written for the most educated audience." Additional results about the hypothetical articles

indicated that formal medical credentials may serve as an important indicator of credibility.

When faced with the concept of finding conflicting online health information, our participants indicated that they would give more credence to the information from the more credible source. They might then continue to research the topic to determine which information source agrees with other credible sources.

CONCLUSION AND FUTURE RESEARCH

The results of this study were straightforward: The “Contact Us” link that did not provide any detailed information about the website publisher increased the credibility of article and author ratings. This result is in contrast to our previous study where the credibility ratings regarding the presence of a physical address varied depending on whether participants were rating the credibility of the author or the article. The more uniform results in the current study may indicate that a “Contact Us” link is a less ambiguous marker of credibility than a street address, which has many factors that can be parsed for markers of credibility. This view is further confirmed in that neither the high- nor low-profile street addresses affected the credibility ratings in the current study. Another possibility is that readers recognize “Contact Us” links more readily than street addresses, perhaps because the phrase “Contact Us” has a more distinctive shape than the block of text that makes up a street address, or because readers, especially younger readers such as the participants in this study, may expect to see “Contact Us” links on webpages but may not expect to see street addresses, except on a designated contacts page.

The results of this and our previous study also indicate that some readers tend to equate the difficulty of medical information with expertise and prefer articles by authors with formal medical credentials. Our results also indicate that credibility judgments are key to readers’ actions when faced with conflicting information. In such situations, users will likely attempt to determine which of the sources of the conflicting information is the most credible and then search for confirmatory information from trusted sources.

Although our study focused on medical information, the results very likely apply to other types of webpages. The goal of most web publishers is

to create sites that are credible to all possible audiences. Unambiguous markers of credibility may exist and may include such straightforward content as date stamps. However, our paper shows that even seemingly simple factors, such as contact information, may elicit unexpected responses among readers that may vary by demographic group. Nevertheless, our research supports the increasingly common practice of including a contact link in page templates at all levels of a website.

The results of this study suggest several areas for future research. Studies should continue to investigate the impact of contact information on assessments of credibility—contact information in page templates and the more detailed information typically found on dedicated contacts pages. Researchers should also continue to examine the effects of other types of credibility cues, such as author credentials and text difficulty. In addition, our results concerning participants’ views of conflicting information could provide a basis for additional qualitative research, either in the form of surveys or observations of participant searches. All of these studies should consider the impact of demographic factors, such as age, literacy, and internet experience, on credibility assessments. Increased understanding of the ways that credibility cues affect members of different groups will help publishers produce online information that is more likely to be trusted and accepted.

ACKNOWLEDGMENT

The authors would like to thank K. J. Hall of the University of Washington School of Public Health and Community Medicine for her assistance with qualitative analysis. Support for this study came from the National Institute of Environmental Health Sciences, National Institutes of Health under Grant ES07033.

REFERENCES

- [1] D. Fallows. (2005, Jan. 23). Search engine users: Internet users are confident, satisfied and trusting—but they are also unaware and naïve. Pew Internet & American Life Project. [Online]. Available: http://www.pewinternet.org/PPF/r/146/report_display.asp
- [2] E. Silience, P. Briggs, P. R. Harris, and L. Fishwick, “How do patients evaluate and make use of online health information?,” *Soc. Sci. Med.*, vol. 64, no. 9, pp. 1853–1862, 2007.

- [3] S. Fox. (2006, Oct. 29). Online health search 2006: Most internet users start at a search engine when looking for health information online. Very few check the source and date of the information they find. Pew Internet & American Life Project. [Online]. Available: http://www.pewinternet.org/~media/Files/Reports/2006/PIP_Online_Health_2006.pdf.pdf
- [4] M. S. Birru, V. M. Monaco, L. Charles, H. Drew, V. Njie, T. Bierria, E. Detlefsen, and R. A. Steinman. (2004). Internet usage by low-literacy adults seeking health information: An observational analysis. *J. Med. Internet Res.* [Online]. Available: <http://www.jmir.org/2004/3/e25/HTML>
- [5] S. Fox and L. Rainie. (2002, May 22). Vital decisions: How internet users decide what information to trust when they or their loved ones are sick. Pew Internet & American Life Project. [Online]. Available: http://www.pewinternet.org/~media/Files/Reports/2002/PIP_Vital_Decisions_May2002.pdf.pdf
- [6] L. Graham and P. T. Metaxas, "Of course it's true: I saw it on the internet!" Critical thinking in the internet era," *Commun. ACM.*, vol. 46, no. 5, pp. 71-75, 2003.
- [7] M. J. Metzger, A. Flanagin, and L. Zwarun, "College student web use, perceptions of information credibility, and verification behavior," *Comput. Educ.*, vol. 41, no. 3, pp. 271-290, 2003.
- [8] D. L. Hansen, H. A. Derry, P. J. Resnick, and C. R. Richardson. (2003). Adolescents searching for health information on the internet: An observational study. [Online]. Available: <http://www.jmir.org/2003/4/e25/HTML>
- [9] A. Spink, Y. Yang, J. Jansen, P. Nykanen, D. P. Lorence, S. Ozmutlu, and H. C. Ozmutlu, "A study of medical and health queries to web search engines," *Health Inf. Libraries J.*, vol. 21, no. 1, pp. 44-51, 2004.
- [10] G. Eysenbach and C. Kohler, "How do consumers search for and appraise health information on the world wide web? Qualitative study using focus groups, usability tests, and in-depth interviews," *British Med. J.*, vol. 324, pp. 573-577, Mar. 9, 2002.
- [11] E. G. Benotsch, S. Kalichman, and L. S. Weinhardt, "HIV-AIDS patients' evaluation of health information on the internet: The digital divide and vulnerability to fraudulent claims," *J. Consulting Clinical Psychol.*, vol. 72, no. 6, pp. 1004-1011, 2004.
- [12] H. Skinner, S. Biscope, B. Poland, and E. Goldberg. (2003). How adolescents use technology for health information: Implications for health professionals from focus group studies. *J. Med. Internet Res.* [Online]. Available: <http://www.jmir.org/2003/4/e32/HTML>
- [13] A. J. Flanagin and M. J. Metzger, "Perceptions of internet information credibility," *J. Mass Commun. Quart.*, vol. 77, no. 3, pp. 515-540, 2000.
- [14] B. R. Bates, S. Romina, R. Ahmed, and D. Hopson, "The effect of source credibility on consumers' perceptions of the quality of health information on the internet," *Med. Inf. Internet Med.*, vol. 31, no. 1, pp. 45-52, 2006.
- [15] L. Ivanitskaya, I. O'Boyle, and A. M. Casey. (2006). Health information literacy and competencies of information age students: Results from the interactive online research readiness self-assessment (RRSA). *J. Med. Internet Res.* [Online]. Available: <http://www.jmir.org/2006/2/e6/>
- [16] B. J. Fogg, J. Marshall, T. Kameda, J. Solomon, A. Rangnekar, J. Boyd, and B. Brown, "What makes web sites credible?: A report on a large quantitative study," in *Proc. SIGCHI Conf. Human factors in Computing Systems*, Seattle, WA, Mar. 31-Apr. 5, 2001, pp. 295-297.
- [17] B. J. Fogg, C. Soohoo, D. R. Danielson, L. Marable, J. Stanford, and E. R. Tauber. How do users evaluate the credibility of web sites? A study with over 2,500 participants. *Proc. Designing for User Experiences Conf.* [Online]. Available: <http://doi.acm.org/10.1145/997078.997097>
- [18] K. Freeman and J. Spyridakis, "An examination of factors that affect the credibility of online health information," *Tech. Commun.*, vol. 51, no. 2, pp. 239-263, 2004.
- [19] M. J. Metzger, "Effects of site, vendor, and consumer characteristics on web site trust and disclosure," *Commun. Res.*, vol. 33, no. 3, pp. 155-179, 2006.
- [20] S. Y. Rieh and D. R. Danielson, "Credibility: A multidisciplinary framework," in *Annu. Rev. Inf. Sci. Technol.*, B. Cronin, Ed. Medford, NJ: Information Today, 2007, vol. 41, pp. 307-364.
- [21] C. C. Self, "Credibility," in *An Integrated Approach to Communication Theory and Research*, M. B. Salwen and D. W. Stacks, Eds. Mahwah, NJ: Lawrence Erlbaum Associates, 1996.
- [22] B. J. Fogg and H. Tseng, "The elements of computer credibility," in *Proc. SIGCHI Conf. Human Factors in Computing Systems*, 1999, pp. 80-87.
- [23] C. I. Hovland, I. L. Janis, and H. H. Kelley, *Communication and Persuasion*. New Haven, CT: Yale University Press, 1953.
- [24] C. I. Hovland and W. Weiss, "Transmission of information concerning concepts through positive and negative instances," *J. Exp. Psychol.*, vol. 45, no. 3, pp. 175-182, 1953.
- [25] S. Ganesan and R. Hess, "Dimensions and levels of trust: Implications for commitment to a relationship," *Market. Lett.*, vol. 8, no. 4, pp. 439-448, 1997.
- [26] M. J. Metzger, A. Flanagin, K. Eyal, D. R. Lumus, and M. McCann, P. J. Kalbfleisch, Ed., "Credibility for the 21st century: Integrating perspectives on source, message, and media credibility in the contemporary media environment," in *Communication Yearbook 27*. Mahwah, NJ: Lawrence Erlbaum Associates, 2003, pp. 293-335.
- [27] C. N. Wathen and J. Burkell, "Believe it or not: Factors influencing credibility on the web," *J. Amer. Soc. Inf. Sci. Technol.*, vol. 53, no. 2, pp. 134-144, 2002.
- [28] R. E. Petty and J. T. Cacioppo, *Communication and Persuasion: Central and Peripheral Routes to Attitude Change*. New York: Springer-Verlag, 1986.

- [29] C. I. Hovland and W. Weiss, "The influence of source credibility on communication effectiveness," *Public Opinion Quart.*, vol. 15, no. 4, pp. 635–650, 1951.
- [30] D. G. Kaufman, M. F. Stasson, and J. W. Hart, "Are the tabloids always wrong or is that just what we think? Need for cognition and perceptions of articles in print media," *J. Appl. Soc. Psychol.*, vol. 29, no. 9, pp. 1984–1997, 1999.
- [31] M. M. Cain, J. Sarasohn-Kahn, and J. C. Wayne. (2000, Aug.). Health e-People: The online consumer experience. California Health Care Foundation. [Online]. Available: <http://www.chcf.org/documents/healthit/HealthEPeople.pdf>
- [32] J. M. Bernhardt and E. M. Felter. (2004, Jan. 3). Online pediatric information seeking among mothers of young children: Results from a qualitative study using focus groups. *J. Med. Internet Res.* [Online]. Available: <http://www.jmir.org/2004/1/e7/HTML>
- [33] T. P. Christensen, F. J. Ascione, and R. P. Bagozzi, "Understanding how elderly patients process drug information: A test of a theory of information processing," *Pharm. Res.*, vol. 14, no. 11, pp. 1589–1596, 1997.
- [34] R. J. Cline and J. L. Engel, "College students' perceptions of sources of information about AIDS," *J. Amer. Coll. Health*, vol. 40, no. 2, pp. 55–63, 1991.
- [35] M. Dutta-Bergman. (2003). Trusted online sources of health information: Differences in demographics, health beliefs, and health-information orientation. *J. Med. Internet Res.* [Online]. Available: <http://www.jmir.org/2003/3/e21/HTML>
- [36] S. Hammond, "Health advertising: The credibility of organization sources," in *Communication Yearbook 10*, M. Allen and R. W. Preiss, Eds. Newburg Park, CA: Sage, 1987.
- [37] L. J. Frewer, C. Howard, D. Hedderley, and R. Shepherd, "The elaboration likelihood model and communication about food risks," *Risk Analysis*, vol. 17, no. 6, pp. 759–770, 1997.
- [38] S. P. LaCoursiere, M. T. Knobf, and R. McCorkle. (2005, Jan. 7). Cancer patients' self-reported attitudes about the internet. *J. Med. Internet Res.* [Online]. Available: <http://www.jmir.org/2005/3/e22/HTML>
- [39] M. S. Eastin. (2001). Credibility assessments of online health information: The effects of source expertise and knowledge of content. *J. Comput. Mediated-Commun.* [Online]. Available: <http://jcmc.indiana.edu/vol6/issue4/eastin.html>
- [40] G. Peterson, P. Aslani, and K. A. Williams. (2003). How do consumers search for and appraise information on medicines on the internet? A qualitative study using focus groups. *J. Med. Internet Res.* [Online]. Available: <http://www.jmir.org/2003/4/e33/HTML>
- [41] N. Guttman, D. Boccher-Lattimore, and C. T. Salmon, "Credibility of information from official sources on HIV/AIDS transmission," *Public Health Rep.*, vol. 113, no. 5, pp. 465–471, 1998.
- [42] S. S. Sundar, "Effect of source attribution on perception of online news stories," *J. Mass Commun. Quart.*, vol. 75, no. 1, pp. 55–68, 1998.
- [43] M. Balshem, "Cancer, control, and causality: Talking about cancer in a working-class community," *Amer. Ethnol.*, vol. 18, no. 1, pp. 152–172, 1991.
- [44] J. M. Bernhardt, R. A. Lariscy, R. L. Parrott, K. J. Silk, and E. M. Felter, "Perceived barriers to internet-based health communication on human genetics," *J. Health Commun.*, vol. 7, no. 4, pp. 325–340, 2002.
- [45] B. R. Bates, S. Romina, R. Ahmed, and D. Hopson, "The effect of source credibility on consumers' perceptions of the quality of health information on the internet," *Med. Inf. Internet Med.*, vol. 31, no. 1, pp. 45–52, 2006.
- [46] Princeton Survey Res. Assoc. (2002, Jan.). A matter of trust: What users want from web sites. Consumer WebWatch. [Online]. Available: <http://www.consumerwebwatch.org/pdfs/a-matter-of-trust.pdf>
- [47] T. Hong, "The influence of structural and message features on web site credibility," *J. Amer. Soc. Inf. Sci. Technol.*, vol. 57, no. 1, pp. 114–127, 2006.
- [48] J. B. Walther, Z. Wang, and T. Loh. (2004, Sep. 3). The effect of top-level domains and advertisements on health web site credibility. *J. Med. Internet Res.* [Online]. Available: <http://www.jmir.org/2004/3/e24/HTML>
- [49] S. Fox and D. Fallows. (2003, Jul. 16). Internet health resources: Health searches and email have become commonplace, but is there room for improvement in searches and overall internet access? The Pew Internet & American Life Project. [Online]. Available: <http://www.pewinternet.org/reports/toc.asp?Report=95>
- [50] E. Silience, P. Briggs, L. Fishwick, and P. Harris, "Trust and mistrust of online health sites," in *Proc. SIGCHI Conf. Human Factors in Computing Systems*, pp. 663–670, 2004.
- [51] S. Fox. (2005, May 17). Health information online: Eight in ten internet users have looked for health information online, with increased interest in diet, fitness, drugs, health insurance, experimental treatments, and particular doctors and hospitals. Pew Internet & American Life Project. [Online]. Available: http://www.pewinternet.org/~media/Files/Reports/2005/PIP_Healthtopics_May05.pdf.pdf
- [52] Harris Poll. (2007, Jul. 31). Harris Poll shows number of "cyberchondriacs"—adults who have ever gone online for health information—increases to an estimated 160 million nationwide. Harris Interactive. [Online]. Available: http://www.harrisinteractive.com/harris_poll/index.asp?PID=792
- [53] M. L. Ybarra and M. Suman, "Help seeking behavior and the internet: A national survey," *Int. J. Med. Inform.*, vol. 75, no. 1, pp. 29–41, 2006.
- [54] A. Flanagan and M. J. Metzger, "The role of site features, user attributes, and information verification behaviors on the perceived credibility of web-based information," *New Media Soc.*, vol. 9, no. 2, pp. 319–342, 2007.
- [55] V. Rideout, T. Neuman, and M. Kitchman. (2005, Jan. 12). E-health and the elderly: How seniors use the internet for health information. Henry J. Kaiser Family Foundation. [Online]. Available: <http://www.kff.org/entmedia/7223.cfm>

- [56] H. Lebo. (2004, Sep.). The digital future report. Surveying the digital future, year four. USC Annenberg School, Center for the Digital Future. [Online]. Available: <http://www.digitalcenter.org/downloads/DigitalFutureReport-Year4-2004.pdf>
- [57] H. I. Finberg, M. L. Stone, and D. Lynch, "Digital journalism credibility study," New York: Online News Association, Jan. 2002.
- [58] A. Flanagan and M. J. Metzger, "The perceived credibility of personal web page information as influenced by the sex of the source," *Comput. Human Behav.*, vol. 19, no. 6, pp. 683–701, 2003.
- [59] C. Gaziano and K. McGrath, "Measuring the concept of credibility," *Journal. Quart.*, vol. 63, no. 3, pp. 451–462, 1986.
- [60] M. D. West, "Validating a scale for the measurement of credibility: A covariance structure modeling approach," *Journal. Quart.*, vol. 71, no. 1, pp. 159–168, 1994.
- [61] P. Meyer, "Defining and measuring credibility of newspapers: Developing an index," *Journal. Quart.*, vol. 65, no. 3, pp. 567–574, 1988.
- [62] Centers for Disease Control and Prevention. (2002, Apr. 2). [Online]. Diabetes: Disabling, Deadly, and on the rise: At a Glance 2002.
- [63] Catalyst Project, WebQ 3.0. [Online]. Available: <http://catalyst.washington.edu/tools/webq.html>
- [64] GVU Georgia Tech. (1998, Oct.). 10th WWW User Survey. Georgia Inst. Technol., Atlanta, GA. [Online]. Available: <http://gvu.cc.gatech.edu/what/websurveys.php>
- [65] I. Skymeg Software. PRAM: A Program for Reliability Assessment With Multiple Coders. [Online]. Available: <http://www.geocities.com/skymegsoftware/pram.html>

Kris S. Freeman received the M.S. degree in technical communication from the University of Washington, Seattle, WA, in 2002. She is a public information specialist at the University of Washington, where she specializes in health, forestry, and marine sciences. She has also been a newspaper reporter, magazine editor, and freelance writer. She has won awards from the Society for Technical Communication and the National Association of Government Communicators.

Jan H. Spyridakis is Professor and Chair of the Department of Human Centered Design and Engineering, University of Washington, Seattle, WA. Her research focuses on the effective design of structural cues in online environments, internet-based research methods, and international communication. She has received many awards for her teaching and research; she also serves on editorial boards and offers courses in industry. She is a Fellow of the Society for Technical Communication.