

# Online Medical Site Interfaces: Trust Study

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## 1. INTRODUCTION

The Internet has become a medium for the masses. Anyone with a computer, a phone line, and minimal knowledge of creating a Web site, can disseminate a message globally. There is limited censorship and no governance of the Internet; therefore the reliability of information online has come into question. While there is a small body of research concerning the trust and credibility of Web sites that offer online transactions, there is little research that directly speaks to the use of graphics, images, and color as communicators of trust online.

For the purpose of our study, we chose to create a medical Web site, as credibility, reliability and trustworthiness is a necessity in the dissemination of medical information.

This paper addresses the issue of trust as communicated through color in an online environment. In doing so, we ask the question: Does color effect a user's sense of trust and reliability in an online environment if all other elements present suggest that the site offers trustworthy information? This paper will answer this question through (1) defining trust, reliability and credibility, (2) outlining elements of a Web site that tend to instill trust in users, (3) presenting our study and three user interfaces which point to color as an equally important element in communicating trust online.

## 2. DEFINITIONS

For the purposes of this study, it is important to understand the meaning of trust and other words used synonymously with trust.

### What is trust?

According to the online edition of the American Heritage Dictionary, trust is a "faith in a person or thing" or "a feeling of assurance." Trustworthiness is defined as "reliable."

### What is reliability?

Reliability is found in much of the literature about the trustworthiness of online e-commerce Web sites. Reliability is that which is "dependable."

### What is credibility?

Credibility is another word found in much of much of the literature regarding Internet Web sites and trustworthiness. Credibility is defined as believability. (American Heritage Dictionary, <http://www.bartleby.com/61/>, n.d.)

## 3. LITERATURE REVIEW

### 3.1 ELEMENTS OF TRUST ONLINE

3.1.1 *eCommerce Trust Study* by The Cheskin Group and Studio Archetype/Sapient (<http://www.cheskin.com/think/trust/index.html>, 1999)

The Cheskin Group/Studio Archetype “eCommerce Study” explored what design and other elements of a Web site communicate trust to users. The study had analysts, consumers and industry leaders review 102 high-profile commerce, publishing and portal sites. The study found that brand alone does not promote a sense of trust in users. In addition to branding, the study found that trust is established by the following:

- Effective navigation
- Fulfillment (e-commerce transactions)
- Presentation (design)
- Use of cutting edge technology
- Seals of approval from security firms (VeriSign, BBB Online, etc.)

**3.1.2 *Doing Business on the Web: How to Get Customers to Trust You*** by Carla Gates  
(<http://www.fivepark.com/articles/trust.html>, n.d.)

Carla Gates addresses design elements of Web sites that help communicate trust to users in her article, *Doing Business on the Web: How to Get Customers to Trust You*. Gates notes the following elements of design:

- Clean and professional appearance
- Clear navigation
- Current and correct content
- Display Privacy Policy
- Good fulfillment process (for e-commerce sites)

## **3.2 MEDICAL WEB SITES AND TRUST**

**3.2.1 *Health Online: truth and virtual lies*** by Charlene Laino, MSNBC  
(<http://www.msnbc.com/news/161811.asp?cp1=1>, n.d.)

In Charlene Laino’s article, *Health Online: truth and virtual lies*, she consulted medical experts to discover how one can find reliable health information on the Internet. Laino gathered tips from Dr. Tom Ferguson, author of *Health Online: How to Find Health Information, Support Groups and Self-Help Communities in CyberSpace*; Dr. George Lundberg, editor of *Medscape* and former editor of the *Journal of the American Medical Association*; Dr. Steven J. Davidson, chairman of the department of emergency medicine at Maimonides Medical Center in Brooklyn, NY; and Dr. Brooks Edwards, medical editor of *MayoClinic.com*.

Below is a list of tips Laino’s experts recommended for Internet Medical site users:

- Verify that information comes from a reputable source, such as a well-known hospital or health-advocacy group.
- Make sure that authors and contributors are identified, along with their affiliations.
- Look to verify if the site is professional managed, by a peer review board or editorial board.
- Check for dates to assure information is not out-of-date.
- Beware of sites selling their own medical products.
- Beware of sites that offer online diagnoses.
- Beware of sites that claim to be the sole source of certain medical information.
- Check to see if site has won awards from credible organizations (to prove it has been reviewed by outside Webmasters).
- Don’t be assured by links to other medical sites.

### 3.3 COLOR AS A COMMUNICATOR OF TRUST AND RELIABILITY

#### 3.3.1 *Satisfying Visitors with Color & Shape* by Molly E. Holzschlag, *Web Techniques* (1999)

In 1999, Molly E. Holzschlag wrote in her *Integrated Design* column for *Web Techniques* an article titled “Satisfying Visitors with Color & Shape.” Excerpts from this column were published online at *WebReview.com*. In her article, Holzschlag explains how color choice communicates information about a Web site, and how color represents the values of the site’s audience.

For example, if designing a community Web site, Holzschlag explains how it is best to use warm colors like greens, oranges and yellows, to “create a sense of comfort and ease.” She further describes the communicative properties of color by identifying two different types of Web sites and the colors she would use to represent the message of each site. Other colors and the elements they communicate and/or represent, according to Holzschlag, are as follows:

COLOR	COMMUNICATION
Orange	Warmth and energy
Bright Green	Nature and Health
White	Precision and Order
Red	Power

Holzschlag further explains the importance in understanding how color represents the values of the site’s audience. For example, Holzschlag identifies the color blue, which she says tends to represent trust in the United States, whereas in other countries, pastels visually communicate trust.

#### 3.3.2 *Designing towards emotional usability in customer interfaces – trustworthiness of cyber-banking system interfaces* – Jinwoo Kim and Jae Yun Moon (1999)

In 1998, Jinwoo Kim and Jae Yun Moon published an empirical study in *Interacting with Computers* which investigated the designing of user interfaces which would “evoke target feelings” in the Web site’s users. While the study focused on online banking system interfaces, the findings were very promising in proving how design and color can communicate trustworthiness and reliability in users. It is important to note that the study’s trust findings were based on responses from a Korean user base and that trust queues can differ between cultures.

Kim and Moon’s study was actually comprised of four smaller studies. The second of the four studies looked at the importance of design factors, including title, navigation, clipart and color, from the user’s point of view. The third of the four studies focused on the correlations between the emotional factors and design factors of the sites. Among the list of emotional factors noted, was trustworthiness. The study found that clipart and the color layout of the site were the most important factors that elicited a sense of trustworthiness, or untrustworthiness by the end user. For the cyber-banking model, Kim and Woo found that the overall color scheme should consist of cool colors, rather than warm colors. Cool colors best created a sense of trust in the site. It was also noted that the use of a “moderate pastel color” as the main color on the site, as well as the use of “low brightness” colors, also attributed to the trustworthiness of the site. Finally, the symmetrical use of colors evoked trust in the site. Sites with bright backgrounds and asymmetrical color schemes resulted in a sense of untrustworthiness.

### 3.4 MEDICAL WEB SITES AND USAGE

#### 3.4.1 *The Online Health Care Revolution: How the Web helps Americans take better care of themselves* by the Pew Internet and American Life Project (<http://www.pewinternet.org/reports/toc.asp?Report=26> , 2000)

The Pew Internet and American Life Project *The Online Health Care Revolution: How the Web helps Americans take better care of themselves* explored how the profile of those using the Internet for the purpose of communicating medical information has shifted from consisting largely of healthcare professionals to a more diverse group of users. The study sought to discover the demographic details of those who are using the Internet as a source of medical information and how they are putting that information to use. The study was conducted using both telephone surveys and daily tracking polls to gather information from over 15,000 participants from March to August 2000. Some of the primary findings of the study included:

- Many more women than men use the Internet to search for medical information.
- Middle-aged users search for medical information online more than very young or very old users.
- The majority of those seeking medical information online do have health insurance coverage
- The longer a user has been online, the more likely they are to have sought medical information on the Internet.

#### 4. STUDY

##### 4.1 Subjects

Ten subjects were selected at random to act as participants for the purpose of the study. Selected characteristics of each are provided in the table below.

Participant ID	Age	Gender	Occupation	Computer Experience Level
1	63	Female	Administrative Assistant	Moderate
2	27	Male	Facilities Management	Low
3	47	Female	Manager	High
4	26	Male	Insurance Agent	Low
5	58	Male	Federal Employee	Moderate
6	31	Male	Internet	High
7	40	Female	Product Manager	High
8	30	Male	CTO, Media Company	High
9	31	Female	HR – Executive Administrator	Low
10	32	Female	Accounts Receivable	Moderate

##### 4.2 Web Site User Interface

Our study used three separate Web site pages (user interfaces) using three different color schemes. Each site consisted of the following:

- Clear Site Navigation
- Search capability
- Privacy Policy
- Dated Content
- Citing of article author and source (all articles are from the same author and source)
- American Medical Association Seal
- Site Name (MedOnline.com)

The layout of all three interfaces were the same, except for (1) color scheme, (2) article topic (all three were medical articles with the same date and author), (3) alignment of branding/title (Site 1 and 2 had the branding left aligned while Site 3's branding was right-aligned). These pages were viewed online at [http://www.unc.edu/~kgrubb/inls180/medonline\\_com.html](http://www.unc.edu/~kgrubb/inls180/medonline_com.html). (See Appendix D).



Site 1



Site 2



Site 3

### 4.3 Survey Tool

The ten participants were provided with a printed questionnaire with which to execute their role in the study. The questionnaire was comprised of three primary sections: (1) Consent Form, (2) Pre-Survey Demographic Questionnaire and (3) Survey.

The Consent form section of the survey tool identified the purpose of the study as well as such specifics as where the study would occur and what would be expected of the participants. It also addressed privacy concerns as well as any risks or discomforts that may occur as a result of participation. Additionally, this section informed the participants of their right to refuse participation or withdraw and provided the participants with contact information for the study administrators. The consent form concluded with a space for the participant to sign and date indicating their agreement with the terms expressed in the prior paragraphs.

The second section of the survey tool, the Pre-Survey Demographic Questionnaire, worked to identify individual characteristics of each participant that would be pertinent to the data analysis phase of the project. This section inquired about the age, gender and occupation of the participant. It also asked several questions addressing the participants prior computer use including inquiries about the frequency of both computer (general) and internet use, application use and use of the internet as a source of both vital and consumer information.

The Survey section was the primary data-gathering component of the survey tool. This section asked the participant to consider the reliability, visual appeal, quality of content and freshness of content for the individual interfaces. Each question required the participant to assign a rating of one (least favorable) to ten (most favorable) for each interface based on the four characteristics previously mentioned. The final two questions of the Survey section allowed the participants to write in comments indicating which of the interfaces they would most and least likely use as their trusted source for medical information.

### 4.4 Survey Process

Once identified, the participants were asked to complete the Consent Form and Pre-Survey Demographic Questionnaire. They were then seated at the workspace of the respective investigator and presented with an online menu containing links to each of the three interfaces. The participants were asked to complete the series of question answering tasks navigating among the three individual web sites. Once completed, the investigator asked the final three questions which allowed the participants to express their opinion about the sites exclusive of the numerical rating system.

### 4.5 Data Analysis

Upon completion of the survey by the ten participants, the data gathered was entered into an Excel spreadsheet for further analysis. The data was compiled and graphed on seven separate factors:

**4.5.1 Reliability:** The total numerical ratings for the individual interfaces were compiled from the ten participants and entered into a comparative bar graph.

**4.5.2 Visual Appeal:** The total numerical ratings for the individual interfaces were compiled from the ten participants and entered into a comparative bar graph.

**4.5.3 Quality of Content:** The total numerical ratings for the individual interfaces were compiled from the ten participants and entered into a comparative bar graph.

**4.5.4 Freshness of Content:** The total numerical ratings for the individual interfaces were compiled from the ten participants and entered into a comparative bar graph.

**4.5.5 Site Ratings by Participant Age:** The ten participants were categorized into three age groups: 20-29, 30-39 and 40+. For each group, an average numerical rating was determined for the individual interfaces and a comparative bar graph was created illustrating how each age group rated each interface.

**4.5.6 Site Ratings by Participant Gender:** The ten participants were categorized into two groups, male and female. For each group, an average numerical rating was determined for the individual interfaces and a comparative bar graph was created illustrating how each gender group rated each interface.

**4.5.7 Site Ratings by Prior Computer Experience:** The ten participants were categorized into three experience-level groups: low, moderate and high. The levels were assigned based on the numerical compilation of the participants' responses to the computer experience questions on the Pre-Survey Demographic Questionnaire. A point system was created whereby the participant was given one point for each answer that indicated prior computer experience. A total of twenty points was possible. The participants were categorized as follows: under fifteen points, low level; sixteen to eighteen points, moderate level; nineteen points and above, high level. For each group, an average numerical rating was determined for the individual interfaces and a comparative bar graph was created illustrating how each experience-level group rated each interface.

## 4.6 RESEARCH FINDINGS

The findings of our research largely supported our hypothesis that color does affect a user's sense of trust and reliability in an online environment when all other elements present suggest that the site offers trustworthy information. The survey findings are summarized below:

**4.6.1 Reliability and Visual Appeal:** When participants were asked to assign ratings to each interface that most appropriately reflected their impression of reliability and visual appeal, the highest ratings were assigned to Site 3. Compiling the total scores issued to each site for reliability, we found that the participants assigned a total of 39 points to Site 1, 49 to Site 2 and 70 to Site 3. For visual appeal, Site 3 again was rated higher scoring a total of 67 points versus 44 for Site 1 and 56 for site 2. (See Appendix E)

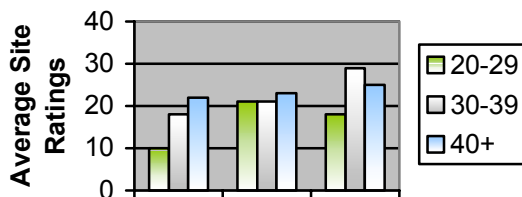
These results were consistent with the findings of Kim and Moon's (1998) study of the cyber-banking model, which indicated that the interfaces deemed trustworthier utilized cool color schemes. The use of this type of palette, specifically the low-brightness, moderate blue pastel color, tended to instill a greater sense of reliability in the participants of this study as well. Aside from reinforcing a sense of trust, this color scheme was also deemed to be the most visually appealing by the participants. The low ratings assigned to Site 1, which employed a bright neon green as the primary color against a black background, also vindicated Kim and Moon's findings in that their study indicated that sites with bright and asymmetrical color schemes were less effective in establishing a sense of trust in the user.

**4.6.2 Quality and Freshness of Content:** These two aspects of the findings returned interesting results. The three interfaces were designed to comply with the many of suggestions offered in Laino's article, *Health Online: truth and virtual lies (n.d.)*. The recommendations implemented included: Identification of the authors and contributors, along with their affiliations; Dates to assure the freshness of content; Absence of product solicitation; Absence of online diagnoses; Absence of claims indicating that site is the sole source of certain medical information; Inclusion of American Medical Association seal.

Though each of the sites included this set of elements, interface design seemed to impact the participant’s impression of quality and freshness of content. For quality of content, a total of 41 points was assigned to Site 1, 50 points to Site 2 and 57 points to Site 3. The ratings for freshness of content furthered supported our theory with participants assigning 54 points to Site 1, 62 points to Site 2 and 64 points to Site 3, despite the fact that the same date was provided for each interface. Clearly, the varying use of color and alignment was of greater influence in evaluating content than the elements of the content itself. (See Appendix E)

**4.6.3 Site Ratings By Participant Age:** As previously indicated, the participants were categorized into three groups based on age. An average score was assigned to each interface for each age group. For the group aged 20-29, an average score of 10 was assigned to Site 1, 18 to Site 2 and 22 to Site 3. The second group, aged 30-39, assigned an average score of 21 to Site 1, 21 to Site 2 and 23 to Site 3. The third group, aged 40+, assigned an average score of 18 to Site 1, 29 to Site 2 and 25 to Site 3.

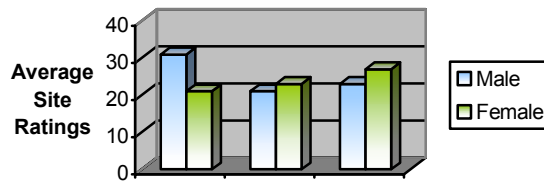
**Average Site Ratings by Participant Age**



The findings indicate that the two older groups rated Site 3 the highest, while the youngest group rated Site 2 the highest. A survey conducted by the Pew Internet and American Life Project titled *The Online Health Care Revolution: How the Web helps Americans take better care of themselves* (2000) found that “health seekers are proportionally more middle-aged than very young or old, with the highest proportions of usage showing up in those between the ages of 30 and 64” (Pew..., 2000). It is our belief that the groups aged 30-39 and 40+ assigned higher ratings to Site 3 than the younger group of 20-29 as a result of having more experience interacting with actual online medical sites. It is our belief that they recognized the interface of Site 3 as being the most similar to other online medical sources and the most appropriate format for the communication of such information.

**4.6.4 Site Ratings by Participant Gender:** As mentioned earlier, the participants were categorized by gender and their scores were compiled to determine an average rating for each site. The male participants assigned an average score of 31 to Site 1, 21 to Site 2 and 23 to Site 3. The female participants assigned an average score of 31 to Site 1, 23 to Site 2 and 27 to Site 3.

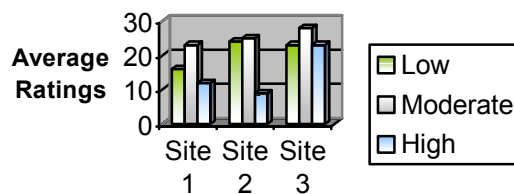
### Average Site Ratings by Participant Gender



The findings of this set of data can be explained in a similar fashion as those of the Site Ratings by Participant Age. The Pew Internet and American Life study (2000) states that “the health-seeker population is made up of many more women than men. Fully 63% of women with Internet access have sought health information, while 46% of online men have done that. On a typical day, this gender difference is reflected in the fact that 59% of those seeking such information are women .” (Pew..., 2000) Again, it is our belief that the potential for increased exposure to online medical sites by the female participants may have contributed to their higher rating of Site 3, the interface which most closely resembles many reputable online sources of medical information.

**4.6.5 Site Ratings by Prior Computer Experience:** As previously indicated, the participants were categorized into three groups based on prior computer experience. An average score was assigned to each interface for each of the three experience level groups. For the low-level group, an average score of 16 was assigned to Site 1, 24 to Site 2 and 23 to Site 3. The second group, moderate-level, assigned an average score of 23 to Site 1, 25 to Site 2 and 28 to Site 3. The third group, high-level, assigned an average score of 12 to Site 1, 9 to Site 2 and 23 to Site 3.

### Average Site Ratings by Prior Computer Experience



These findings again lead us to examine the results of The Pew Internet and American Life study. The study states: “The other demographic trait that distinguishes health seekers is their level of experience with the Internet. The longer someone has had access to the Internet, the more likely it is that she has gotten medical information. Some 59% of those with three years of Internet experience have sought medical information, compared to 47% of those who first went online within the past six months.”(Pew..., 2000) Though our participants were asked about the extent to which they use computer applications and the Internet, rather than the length of time that they have had online access, we believe that the results of this set of data are comparable to those of the Pew Internet and American Life Study (2000). The data demonstrates that those whose scores placed them in the “moderate” and “high” group assigned the most favorable ratings to Site 3. Again, it is our belief that the potential for increased exposure to online medical sites by the more experienced users may have contributed to their higher rating of Site 3, the interface which most closely resembles many reputable online sources of medical information.

## CONCLUSION

The use of the Internet as a source for vital information has transformed the way people educate themselves regarding health issues. There is much research yet to be done, however the findings of this study show that enabling the public to trust the medical content that they find online is largely a matter of presentation. By studying and applying knowledge about establishing trust through online interfaces, we may better construct a foundation for presenting credible and reliable information to users.

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