Consumer Perspectives on Quality Attributes in Evaluating Health Websites

Donghua Tao  
Saint Louis University  
taod@slu.edu

Cynthia M. LeRouge  
Saint Louis University  
lerouge@slu.edu

Gloria Deckard  
Florida International University  
deckardg@fiu.edu

Gianluca De Leo  
Old Dominion University  
GDeLeo@odu.edu

Abstract

Healthcare consumers are increasingly turning to the Internet for health information. Health website sponsors and developers are challenged to ensure high quality to satisfy the spectrum of site visitors. Yet, research does not seem to provide needed guidance from the perspective of the healthcare consumer. In response, this study provides a taxonomy of website quality attributes and explores differences in ratings of the importance of 15 quality attributes of health websites from healthcare consumers. Both quantitative and qualitative methods were deployed to collect the data.

1. Introduction

Today’s healthcare environment encourages patients to take a more active role in managing their health and medical care and in participating in their healthcare decision making [1]. To do so, patients are seeking healthcare information on the Internet; and healthcare providers are utilizing technology, including Internet websites, to provide information and to assist patients in the management of care, e.g., disease management. Eysenbach and Kohler [2] estimated that approximately 4.5% of all search queries submitted to Web search engines are health-related which is equivalent to a minimum of 6.75 million health-related searches on the Web every day. Whether seeking more knowledge on disease and care processes for oneself or family members or seeking advice on well-being and fitness, healthcare consumers increasingly turn to the Internet for health information [3-5]. Healthcare information obtained through the Internet searches significantly impacts consumers’ decisions on treatment, communications with providers, and their overall approach to maintaining health [3].

With the vast volume and variety of health information sought online and given the potential outcomes of the utilization of this information, health website sponsors and developers are increasingly challenged to ensure high quality and good design.

Yet, research does not seem to provide this needed guidance. Piccoli, et al.[6] lamented the “dearth of research-based insights and guidelines concerning the roles, functionalities, and effective design of websites.” Zeithami, Parasuraman and Malhotra [7] suggested that future research focus on investigating questions about the importance of different dimensions and perceptual attributes essential to electronic service quality.

General healthcare consumers include individuals that are considered average people; these individuals are not practicing healthcare practitioners (e.g., physicians and nurses), who possess recognized levels of healthcare expertise in the delivery of care to patients. An understanding of the attributes most important to the different healthcare consumer audiences will allow health website sponsors and designers to focus on attributes of importance to their targeted end users. Existing studies of website design and quality often rely on the perceptions of medical providers and/or health experts rather than insight into the perceptions of a more general healthcare consumers in specifying health website quality [4, 8]. As noted by Sillence, et. al. [9], reliance on the perspective of those with health expertise can be problematic as general consumers seek and appraise information differently from experts. A recent literature review (covering literature from 1997 to 2007) analyzed studies related to the information seeking behavior of physicians. This review indicated that research to date shows that physicians seek information for both research and patient care decisions [10]. Information seeking related to patient care decisions often relates to diagnostic (medical testing) and treatment decisions. Predominant electronic resources referenced as being used by physicians included Medline and UPTODATE. Internet sites referenced by physicians in past studies, included the British Medical Journal, Cochrane Review, and electronic libraries of health data sponsored by national organizations [10].

Examples of the noted differences between physicians and other healthcare experts versus the general healthcare consumers include a number of website features. For instance, general consumers
generally report visual appeal and navigation as
important criteria, followed by content factors,
website sponsorship, and personalization. On the
other hand, physicians and other health experts often
focused on evaluating the reputation of the site’s
owner, associations, the specific sources of each
article, and author’s credentials [11]. General
healthcare consumers appear to value customer
service more than health experts while health experts
tended to devalue a site with a commercial motive,
ads and flashy graphics [11]. Thus, websites designed
solely from the perspective of healthcare experts may
not meet the general consumers’ expectations
resulting in potential misuse or lack of use, even if
content is medically accurate and meets the standards
valued by healthcare experts.

Indeed, recognizing that physicians and other
healthcare experts may have a different perspective
from general healthcare consumers is important to
web sponsors and designers that seek to meet the
needs and expectations of the general healthcare
consumer audience. That said, we must also
recognize that some healthcare consumers, though
not practicing medical experts delivering direct
patient care, do possess some healthcare knowledge,
which may influence their perceptions of web site
quality. From a research perspective, studying
general healthcare consumers with varying
backgrounds should provide some insight regarding
differences in perspectives of quality criteria for
health websites; this insight is not present in existing
literature. From the perspective of website design
and interface, understanding of the commonalities
and differences among healthcare consumer groups
may help determine the quality attributes most
important to the site’s targeted end user.

To bridge the stated gaps in the health website
design literature, the overall goals of this study are to:
1) provide a comprehensive listing of quality
attributes deemed relevant by general healthcare
consumers, 2) establish the importance of specific
quality attributes in order to improve content and
design based on the input of general healthcare
consumers, and 3) examine differences in perceptions
of various quality attributes between health
consumers with healthcare background and those
with specified backgrounds in another field (business
in this case).

2. Background

Previous studies that examine health websites
vary in the quality attributes of interest. Attributes
incorporated in multiple studies include accuracy,
currency, supporting hierarchy of evidence, reference
to the original source, comprehensiveness of the
presentation, usability and navigability [12, 13]. Kim
and colleagues [14] found that the most frequently
cited criteria were those dealing with content, design,
and aesthetics of site. Eysenbach’s systematic review
of health website evaluations noted that accuracy,
completeness, readability, design, disclosures, and
references as the most frequently used quality criteria
[15]. O’Grady, et al. [16] developed an evaluation
framework for collaborative, adaptive, and interactive
health websites, which includes content accuracy,
credibility, completeness, understandability,
relevance, level of personalization, privacy, security,
usability, and accessibility, etc. Other studies
evaluating health websites have focused on specific
topics such as pain, dementia, rheumatoid arthritis,
and diabetes [9] and have used these criteria as
quality evaluation guideline. However, no “golden
standard” criteria (i.e., attribute listing) have been
accepted for healthcare website evaluation [12].

Among the quality criteria discussed above, not
all heuristics are equally important to healthcare
consumers. Stvilia, Mon and Yi [17] found that
consumers ranked accuracy highest, followed by
completeness, authority (reputation), usefulness, and
accessibility in order of importance to health
information seeking. It has been found that
consumers do not check the authorship or owners of
the website, as opposed to experts [2, 3, 18]. Instead,
consumers make a personal judgment on how
accurate they believe the information is [11] or use a
variety of non-scientific verification methods to
ascertain the quality of health websites by asking
questions like “is there someone who is making
money from this information?”, or by distinguishing
whether or not the website has a professional layout,
understandable language, and good references to
other sources of information; whether or not the
information appears in several independent websites
or the information is verified by other consumers
[8,19]. Stanford and colleagues [11] found that
consumers tended to rely heavily on overall visual
design when assessing web sites, including layout,
typography and color schemes, which echoes the
report from Wall Street Journal [20]. The conflict in
findings in research to date that specifically look at
consumers perceptions of health website quality may
be attributed to inconsistency in the scope of
attributes used in each study and/or the lack of a
formal rating or ranking process among attributes. In
addition, the possibility exists that perceptions of the
quality of health and healthcare websites may differ
according to websites users’ current background.

What is sometimes not clear or consistent in past
research is the backgrounds of those included in the
health consumer sample studied (e.g., [17]). Namely, do any of these individuals have any form of healthcare background that could skew their perceptions? Not everyone engaged in the healthcare domain is a practicing healthcare practitioner (e.g., physicians and nurses), who possesses recognized levels of healthcare expertise in the delivery of care to patients. The Bureau of Labor Statistics [21] indicated that the healthcare industry and business professions are the two largest employment areas in the following ten years. Employment for those in healthcare and technical occupations is expected to increase by 21 percent, resulting in a projected 1.6 million new jobs whereas employment in business and financial operations occupations is projected to grow by 18 percent, resulting in 1.2 million new jobs from 2008-2018. Thus, these two distinct groups of healthcare and business account for a large number of the educated workforce in the US. Though some portion of the Bureau of Labor Statistics represent physicians, physicians do not represent the vast majority of those employed by the healthcare industry [22]. This issue is important as differences in perspectives of health websites are often, at least indirectly, attributed to the different perspectives that healthcare consumers possess. Therefore, it is relevant that a study that looks at the quality criteria used by healthcare consumers recognize the possibility that subgroups composed of those with healthcare backgrounds may report different perspectives. To further explore perceptual differences that may exist among different consumer groups, this research explores differences in ratings of the importance of quality attributes of health websites by individuals with healthcare backgrounds and those with business backgrounds. Given that business professionals also represent a large portion of the U.S. workforce, we use those with college-level business backgrounds as a means to specifically define a comparative subgroup to those with healthcare backgrounds.

A 2006 national survey found that almost 80% of Internet users over the age of 18 have searched online for health-related information, and that those most groups likely to have done so are between the ages of 18-49, women, and college graduates [3]. Our sample includes those with college level healthcare or business backgrounds. By using college-educated participants in both groups we reflect past demographics of health and healthcare web site users and also stabilize the education level between our comparative groups. To further emulate current and potential users of health websites, our study participants are between 20 and 41 years old.

To attend to the study purpose, we propose to answer the following research questions:

1) What listing of attributes (from a healthcare consumer perspective) comprises appropriate criteria for the design and evaluation of health websites?

2) How do healthcare consumers rate the importance of the quality attributes identified for health websites?
   a) How do consumers with healthcare backgrounds rate the importance of the quality attributes identified for health websites?
   b) How do consumers with backgrounds in other professions, i.e., business, rate the importance of the quality attributes identified for health websites?

3) What differences, if any, exist between consumers with backgrounds in health and healthcare and consumers with backgrounds in other professions, i.e., business, in their respective ratings of the importance of the quality attributes for health websites?

3. Methods

This study employs quantitative and qualitative methods to address the research questions. We used a two-phase process to a) provide a comprehensive and relevant listing of quality attributes and b) to facilitate conceptualization and identification of these attributes using terminology familiar to participants. In Phase 1, we determined attributes of interest through four group interviews (approximately ten students per interview) with upper division and graduate students in healthcare domains (not engaged in direct patient care) as well as business domains. These students responded to the question, “What quality attributes of a healthcare website would lead to (visitor satisfaction/promoting desired behaviors by the site sponsors/consumer site loyalty).” Collectively, participants in the group interviews addressed this question from the perspective of various types of consumers (e.g., “if I were a… patient, well-person looking for information, and caregivers, etc.). Interviewees were then asked to comment on relevance of potential attributes found in the literature that were not included in their responses. All attributes suggested as relevant by any interview group were included in the cumulative list of attributes for further study in Phase 2 of data collection. The research team reconciled conceptually redundant terms within and across interview groups. The final, collective attribute list was a cross section
of the attributes identified by all four groups (see Table 1).

Phase 2 consisted of a quality assessment exercise developed using the attributes identified. Upper division and graduate students in colleges of business, allied health, and public health at two universities completed the exercise (198 students total - 92 students from health-related domain and 106 from business domains). No participants were practicing healthcare practitioners (e.g., physicians and nurses), who possess recognized levels of healthcare expertise in the delivery of care to patients. One university was located in mid-west United States and the other in eastern United States. Participants were asked to rate two healthcare consumer websites (WebMD and one of their choice) to ground them in the context of the study and to provide assurance that all participants had indeed visited at least two healthcare websites from an evaluative perspective in addition to past healthcare web site experience. As part of the primary focus of the study, participants also rated the general importance of the 15 quality attributes for health websites on a low importance to high importance scale of 1 to 5 with 5 anchored as, “This characteristic is very important to my assessment of a healthcare website”. We used basic statistics (e.g., means and standard deviations to compare importance ratings of quality attribute) for importance ratings of attributes and ANOVA to compare ratings of importance criteria between health students and others.

Participants also responded to a qualitative question “What would cause you to rate a health website with a high score of 5?” for each attribute to gain further insight regarding what drives importance ratings for each respective group. Qualitative, open-ended coding procedures were used to review participant commentary associated with those quality attributes that displayed statistically significant differences between the healthcare and business domain groups (e.g., differences in specific features each group look for) to further understand the significant differences noted in the importance of quality attributes.

4. Results

4.1. Criteria List: Attribute Ratings

Table 1 presents the refined listing of quality attributes as well as the importance of the quality attributes identified for health and healthcare websites across all participants. All attributes included in our listing were rated 3.30 or higher which indicates that overall perceptions consider each attribute to be of value (above the neutral level). Thus, these attributes may serve as the foundation for health web site sponsors and designers to consider in their web site design and evaluation.

Table 2 indicates how participants with healthcare backgrounds rated the importance of the quality attributes identified for health and healthcare websites. Understandability of Information and Completeness of Information display the highest means with relatively little standard deviation. In contrast, Ability to Customize Site to Personal Needs, Appropriate Graphic Used to Support Information, and Visual Appeal of Site were the lowest rated attributed. However, it is noted that even these three “lower rated” attributes had means above the central neutral point of the Likert-type scale, indicating that to some degree, participants with healthcare backgrounds considered all 15 characteristics as desirable site attributes.

Table 1. Importance ratings of website quality attributes by consumers

<table>
<thead>
<tr>
<th>Attribute</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completeness of Information</td>
<td>196</td>
<td>4.88</td>
<td>.34</td>
</tr>
<tr>
<td>Understandability of Information</td>
<td>196</td>
<td>4.86</td>
<td>.36</td>
</tr>
<tr>
<td>Relevancy of Information</td>
<td>195</td>
<td>4.64</td>
<td>.59</td>
</tr>
<tr>
<td>Level of Information Detail</td>
<td>196</td>
<td>4.57</td>
<td>.63</td>
</tr>
<tr>
<td>Accuracy of Information Provided by Site</td>
<td>159</td>
<td>4.49</td>
<td>.88</td>
</tr>
<tr>
<td>Reputation of Authority</td>
<td>196</td>
<td>4.46</td>
<td>.87</td>
</tr>
<tr>
<td>Site Reputation</td>
<td>195</td>
<td>4.43</td>
<td>.74</td>
</tr>
<tr>
<td>Adequacy of Reference Provided by Site</td>
<td>195</td>
<td>4.37</td>
<td>.80</td>
</tr>
<tr>
<td>Easy of Navigating Site</td>
<td>196</td>
<td>4.29</td>
<td>.74</td>
</tr>
<tr>
<td>Adequacy of Customer Service</td>
<td>160</td>
<td>4.03</td>
<td>1.04</td>
</tr>
<tr>
<td>Sensitivity to Consumer Feelings</td>
<td>195</td>
<td>3.94</td>
<td>1.02</td>
</tr>
<tr>
<td>Level of Security</td>
<td>157</td>
<td>3.92</td>
<td>1.20</td>
</tr>
<tr>
<td>Visual Appeal of Site</td>
<td>160</td>
<td>3.66</td>
<td>1.04</td>
</tr>
<tr>
<td>Appropriate Graphics Used to Support Information</td>
<td>196</td>
<td>3.46</td>
<td>1.03</td>
</tr>
<tr>
<td>Ability to Customize Site to Personal Needs</td>
<td>160</td>
<td>3.30</td>
<td>1.13</td>
</tr>
</tbody>
</table>
Table 2. Importance ratings of website quality attributes by consumers with healthcare backgrounds

<table>
<thead>
<tr>
<th>Attribute</th>
<th>N</th>
<th>Mean</th>
<th>Std dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understandability of Information</td>
<td>90</td>
<td>4.86</td>
<td>.35</td>
</tr>
<tr>
<td>Completeness of Information</td>
<td>90</td>
<td>4.81</td>
<td>.42</td>
</tr>
<tr>
<td>Reputation of Authority</td>
<td>90</td>
<td>4.53</td>
<td>.78</td>
</tr>
<tr>
<td>Sponsoring Site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequacy of Reference Provided by Site</td>
<td>89</td>
<td>4.52</td>
<td>.84</td>
</tr>
<tr>
<td>Relevancy of Information</td>
<td>89</td>
<td>4.51</td>
<td>.64</td>
</tr>
<tr>
<td>Accuracy of Information</td>
<td>67</td>
<td>4.49</td>
<td>.78</td>
</tr>
<tr>
<td>System Provided by Site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy of Navigating Site</td>
<td>90</td>
<td>4.46</td>
<td>.72</td>
</tr>
<tr>
<td>Level of Information Detail</td>
<td>90</td>
<td>4.40</td>
<td>.71</td>
</tr>
<tr>
<td>Site Reputation</td>
<td>89</td>
<td>4.39</td>
<td>.88</td>
</tr>
<tr>
<td>Level of Security</td>
<td>67</td>
<td>4.36</td>
<td>.94</td>
</tr>
<tr>
<td>Adequacy of Customer Service</td>
<td>68</td>
<td>4.25</td>
<td>.92</td>
</tr>
<tr>
<td>Sensitivity to Consumer Feelings</td>
<td>89</td>
<td>4.04</td>
<td>1.01</td>
</tr>
<tr>
<td>Visual Appeal of Site</td>
<td>90</td>
<td>3.98</td>
<td>.90</td>
</tr>
<tr>
<td>Appropriate Graphics Used to Support Information</td>
<td>68</td>
<td>3.76</td>
<td>.90</td>
</tr>
<tr>
<td>Ability to Customize Site to Personal Needs</td>
<td>68</td>
<td>3.72</td>
<td>1.13</td>
</tr>
</tbody>
</table>

Table 3 presents how participants with business backgrounds rated the importance of the quality attributes identified for health and healthcare websites. Like the healthcare domain participants, Understandability of information and Completeness of Information has the highest means with relatively little standard deviation. Also like those with healthcare backgrounds, Ability to Customize Site to Personal Needs, Appropriate Graphic Used to Support Information, and Visual Appeal of Site were the lowest rated attributes. However, unlike the healthcare participants, two of the “lower rated” attributes, Ability to Customize Site to Personal Needs, and Visual Appeal of Site, had means at the neutral point of the Likert-type scale, indicating that to some degree, participants in business domains may not consider these lower two characteristics as key attributes in rating health websites.

With that difference noted, we explored the differences between the groups in Table 4 by comparing the ratings utilizing ANOVA. Table 4 depicts the statistically significant differences that exist between those with healthcare and those with business backgrounds in their respective ratings of the importance of the quality attributes for health websites. As displayed in Table 4, differences in 9 of

Table 3. Importance ratings of website quality attributes by consumers with business backgrounds

<table>
<thead>
<tr>
<th>Attribute</th>
<th>N</th>
<th>Mean</th>
<th>Std dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completeness of Information</td>
<td>106</td>
<td>4.94</td>
<td>.23</td>
</tr>
<tr>
<td>Understandability of Information</td>
<td>106</td>
<td>4.86</td>
<td>.37</td>
</tr>
<tr>
<td>Relevancy of Information</td>
<td>106</td>
<td>4.75</td>
<td>.53</td>
</tr>
<tr>
<td>Level of Information Detail</td>
<td>106</td>
<td>4.71</td>
<td>.51</td>
</tr>
<tr>
<td>Accuracy of Information</td>
<td>92</td>
<td>4.48</td>
<td>.95</td>
</tr>
<tr>
<td>Site Reputation</td>
<td>106</td>
<td>4.45</td>
<td>.59</td>
</tr>
<tr>
<td>Reputation of Authority Sponsoring Site</td>
<td>106</td>
<td>4.39</td>
<td>.93</td>
</tr>
<tr>
<td>Adequacy of Reference Provided by Site</td>
<td>106</td>
<td>4.24</td>
<td>.74</td>
</tr>
<tr>
<td>Easy of Navigating Site</td>
<td>106</td>
<td>4.15</td>
<td>.73</td>
</tr>
<tr>
<td>Adequacy of Customer Service</td>
<td>92</td>
<td>3.87</td>
<td>1.11</td>
</tr>
<tr>
<td>Sensitivity to Consumer Feelings</td>
<td>106</td>
<td>3.84</td>
<td>1.02</td>
</tr>
<tr>
<td>Level of Security</td>
<td>90</td>
<td>3.60</td>
<td>1.27</td>
</tr>
<tr>
<td>Appropriate Graphics Used to Support Information</td>
<td>92</td>
<td>3.57</td>
<td>1.13</td>
</tr>
<tr>
<td>Visual Appeal of Site</td>
<td>106</td>
<td>3.01</td>
<td>.93</td>
</tr>
<tr>
<td>Ability to Customize Site to Personal Needs</td>
<td>92</td>
<td>2.98</td>
<td>1.03</td>
</tr>
</tbody>
</table>

Table 4. Significant differences in importance ratings of quality attributes between consumers with health care and business backgrounds

<table>
<thead>
<tr>
<th>Attribute</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Appeal of Site *</td>
<td>0.000</td>
</tr>
<tr>
<td>Level of Information Detail *</td>
<td>0.000</td>
</tr>
<tr>
<td>Level of Security *</td>
<td>0.000</td>
</tr>
<tr>
<td>Ability to Customize Site to Personal Needs*</td>
<td>0.000</td>
</tr>
<tr>
<td>Relevancy of Information**</td>
<td>0.003</td>
</tr>
<tr>
<td>Ease of Navigating Site **</td>
<td>0.004</td>
</tr>
<tr>
<td>Completeness of Information **</td>
<td>0.006</td>
</tr>
<tr>
<td>Adequacy of Reference provided by Site**</td>
<td>0.017</td>
</tr>
<tr>
<td>Adequacy of Customer Service **</td>
<td>0.023</td>
</tr>
<tr>
<td>Sensitivity to consumer feelings</td>
<td>0.182</td>
</tr>
<tr>
<td>Appropriate Graphics Used to Support Information</td>
<td>0.258</td>
</tr>
<tr>
<td>Reputation of Authority Sponsoring Site</td>
<td>0.271</td>
</tr>
<tr>
<td>Site Reputation</td>
<td>0.576</td>
</tr>
<tr>
<td>Understandability of Information</td>
<td>0.811</td>
</tr>
<tr>
<td>Accuracy of Information System provided by site</td>
<td>0.981</td>
</tr>
</tbody>
</table>

* Significant with P=.01 / ** Significant with p =.05
the 15 website attributes of interest were statistically significant. Participants in healthcare fields found the following three attributes to have significantly higher importance than those in other (business) domains – Level of Information Detail, Relevancy of Information, and Completeness of Information. Participants in other (business) fields indicated the following six attributes to rate higher in importance than those in healthcare domains – Visual Appeal of the Site, Level of Security, Ability to Customize the Site to Personal Needs, Ease of Navigating Site, Adequacy of References Provided by Site, and Adequacy of Customer Service.

4.2. Qualitative Findings for Attributes with Significant Differences

An important contribution of this study is exploration of the attributes that displayed significant differences between the groups with qualitative analysis of the comments provided by study participants in response to the question “What would cause you to rate a health website with a high score of 5?” This review allowed us to determine if the rating differences reflected a difference in conceptualization of expectations for the attributes showing significant differences. In terms of the highly rated attribute, Completeness of Information, both groups considered the variety, depth and comprehensiveness of information and valued the ability to search the site. However, when considering links for more information, responses from the group with healthcare backgrounds indicated they sought articles and more detail while those with business backgrounds sought links to physician offices, referrals and sources of professional help. A similar difference was found with Level of Information Detail; comments from those with healthcare backgrounds indicated they sought more research, statistics, and structured articles while those with business backgrounds sought a wider range of information including “Ask the Expert”, and explanations of terminology.

Perhaps the most interesting differentiation in qualitative responses is related to the Relevancy of Information. Those individuals with healthcare backgrounds provided comments focused on elimination of advertisements and a need for non-commercialization. On the other hand, individuals without healthcare backgrounds provided commentary indicating they considered Relevancy of Information as focusing on health topics as well as guiding one’s healthcare actions (for example indicating if a site visitor should see a doctor or how to treat symptoms).

Qualitative comments related to Ease of Navigation and Level of Security were also similar, except for a distinction based on the need for membership or limited access. Individuals without healthcare backgrounds did not mention the need for limited access, passwords to access additional or privileged (professional) information or the necessity for encryption, whereas those with healthcare backgrounds did.

While slight differences in terminology existed for Reputation, Customer Service, Ability to Customize Site to Personal Needs and Visual Appeal among the qualitative statements, the core distinction appeared to be the ratings rather than conceptualization.

4.3. Criteria Taxonomy

When we analyzed the study participants’ comments about each quality attribute of health and healthcare websites, categories for grouping attributes emerged. To provide a more useful conceptual framework for the criteria and further analysis, a formative taxonomy of website quality attributes was developed. In order to provide a taxonomy which encapsulates the quality attributes and provides website designers with guidelines in concert with consumer perspectives, three of the researchers involved in the study reviewed the attributes identified by the literature and the focus groups, the ratings, and the qualitative comments. The researchers then compared their individual reviews and categorizations to determine consistency, clarify any differences and enhance content validity. Based on this analysis, formative categorizations were developed. These categorizations include Information Quality, User-focused Design, and Confidence. The attributes comprising each of these themes are presented in Table 5.

Among three categories, Information Quality is focused on content presented on the health and healthcare websites while User-focused Design is concerned with the aspects of the website design which includes navigation, layout, customization, logical organization, presentation, and appeal, etc. The Confidence category is developed from consumers’ perceptions of validity and reputation. References provided by websites, site reputation, website sponsor’s reputation, and information security are four aspects that would play roles in end-users’ confidence in using the websites.
Table 5. Taxonomy of Healthcare Website Quality Attributes

<table>
<thead>
<tr>
<th>Information Quality (Content)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy of Information</td>
<td></td>
</tr>
<tr>
<td>Completeness of Information</td>
<td></td>
</tr>
<tr>
<td>Level of Information Detail</td>
<td></td>
</tr>
<tr>
<td>Relevancy of Information</td>
<td></td>
</tr>
<tr>
<td>Understandability of Information</td>
<td></td>
</tr>
<tr>
<td>User focused Design</td>
<td></td>
</tr>
<tr>
<td>Ability to Customize Site to Personal Needs</td>
<td></td>
</tr>
<tr>
<td>Adequacy of Customer Service</td>
<td></td>
</tr>
<tr>
<td>Appropriate Graphics Used to Support Information</td>
<td></td>
</tr>
<tr>
<td>Ease of Navigating Site</td>
<td></td>
</tr>
<tr>
<td>Sensitivity to Consumer Feelings</td>
<td></td>
</tr>
<tr>
<td>Visual Appeal of Site</td>
<td></td>
</tr>
<tr>
<td>Confidence</td>
<td></td>
</tr>
<tr>
<td>Adequacy of References Provided by Site</td>
<td></td>
</tr>
<tr>
<td>Level of Security</td>
<td></td>
</tr>
<tr>
<td>Reputation of Authority Sponsoring Site</td>
<td></td>
</tr>
<tr>
<td>Site Reputation</td>
<td></td>
</tr>
</tbody>
</table>

5. Discussion

5.1. Explanations of Findings through the Lens of the Criteria Taxonomy

The differences in ratings and the subsequent ranking of these ratings generated interesting observations which shed light on both the key attributes of importance for consumer assessments of health and healthcare websites and on the different perspectives between those health consumers with healthcare backgrounds and those with business backgrounds, particularly when viewed from the lens of the criteria taxonomy proposed by the study. As displayed in Tables 2 & 3 above, the attributes in the Information Quality category are highly rated in importance by both groups. We note that the completeness, understandability and relevance of information are critical factors for both groups. Overall, consumers with business backgrounds rate the Information Quality attributes higher than those with healthcare backgrounds. Qualitative analysis revealed that consumers with business backgrounds are seek multiple health topics, ranging from health promotion, nutrition, diet, drugs, “Ask the Expert”, clinical research, to explanation of terms, and the like. It is possible that consumers without healthcare background need more comprehensive and detailed explanations in plain language to highly rate health-related information.

On the other hand, we found that with the exception of Ease of Navigation, the importance of the User Focused Design-related attributes to be rated lower by both groups. Study participants are in the age group that has been dubbed as “Millennials”, who were born in an age when services were provided digitally everywhere and thus, digital natives [23]. These Internet savvy consumers have acquired experience and skills of searching the Internet, navigating websites, and interacting with the virtual world, which may cause them to factor User Focused Design attributes of health and healthcare websites as less important than Information Quality or Confidence attributes.

Regarding the Confidence category, the ratings of Reputation of Authority Sponsoring Site and Adequacy of References Provided by Site were found to be high for both groups; however, the importance of these attributes was rated much higher for those with healthcare backgrounds. Collectively reviewing attribute ratings and their respective rankings provide some interesting insights regarding the Confidence category. First, for individuals with healthcare backgrounds, Reputation of Authority Sponsoring Site and Adequacy of References Provided by Site were ranked as more important than the majority of Content attributes. Those in business ranked Content attributes first, taking rankings one through five; and the Confidence category attribute of Reputation of Authority Sponsoring Site was sixth. One can interpret this finding from at least two perspectives. The Confidence category attributes of Reputation of Authority Sponsoring Site and providing references may be more important to those with a healthcare background as they recognize the need to have valid, reliable and well-documented information. Individuals who have healthcare backgrounds may also have more knowledge of Reputation of Authority Sponsoring Site and, therefore, place more weight on this attribute. An opposing perspective suggests that consumers with no background in healthcare may be too trusting of health websites and fail to adequately review the source of information provided. Indeed, this finding is consistent with Fox [3] who reported that only 15% of individuals say they “always” check the source and date of the health information they find online, while another 10% say they do so “most of the time.” Meanwhile, the CDC Wonder Data 2010 [24] reported that just 19% of health websites disclose the source, person or organization responsible for the content.
5.2. Implications for the health website design

The study findings present a user-derived taxonomy of health website quality criteria. These differences can inform website developers of important website design principles and guidelines. Website quality and design should align with consumer expectations and judgments. In addition, the study provides different perspectives on the importance rankings of health website quality attributes included in the taxonomy from two large employment sectors of consumers who use the Internet to seek for health information.

Consumers and providers of healthcare, health information, and health websites can have contrasting perceptions. The study findings raise the practical question, “can the same website satisfy different consumer groups?” Karsh, et al. [25] discussed the "one size fits all" fallacy in the design of health information technology (HIT). In order to meet needs of different user groups in different situations and environments, “HIT should be designed to: (a) facilitate the necessary collaboration between health professionals, patients, and families; (b) recognize that each member of the collaborative team may have different mental models and information needs; and (c) support both individual and team care needs across multiple diverse care environments and contexts.” Therefore, fundamental design of the systems is the key to successfully implement HIT. As one type of health information system, health and healthcare websites should be designed with a user-focused design philosophy. This philosophy directs health-related website developers to thoroughly consider the websites’ target user groups and their information needs, and information seeking and search behaviors. Based on the user groups’ profile, the content and interface of web pages can be designed with various paths and options in mind to address the preferences of each subgroup. In the case of the current study, consumers with healthcare backgrounds and those with business backgrounds present different requirements for the content, information representation, and interactive features of the health and healthcare websites. For health websites with target users in both health and business professions, organizing and presenting the same information in two ways that can meet each group’s needs could be an option to solve the "one size fits all" problem. However, this may not be a feasible option.

Overall, for a website designed to satisfy more than one user group, the highly rated commonalities of the different target user groups should be the first concern. The current study found Information Quality (content) related quality attributes were ranked high in both groups with health and business backgrounds. Therefore, the attributes in the Information Quality category should be the primary focus in designing or evaluating the health website. Roberts, et. al. [26] indicated 60% of website acceptance came from meeting/exceeding the user’s mental model while 30% from the “feel”, and 10% from the “look”. In order to develop a health or healthcare website that is functional and usable, it is imperative to reach the level of personal connection that captures the essence and issues of user groups by creating a reasonable approximation of the targeted users’ mental models. In the case of this study, findings indicate that sponsors and designers should pay careful attention to Information Quality attributes (Accuracy of Information, Completeness of Information, Level of Information Detail, Relevancy of Information, and Understandability of Information) to capture the health consumers’ mental model.

6. Limitations and Future Work

The current study does have limitations in interpretation and generalization, which help to point the way towards further research. First, efforts have been made to develop comprehensive quality criteria, guidelines, and voluntary codes of trust for both website developers to comply with and consumers on how to judge the quality of a website [27, 28]. However, no “golden standard” criteria have been accepted for health website evaluation that reflect the requirements of health consumers [9]. The quality categories summarized in the criteria taxonomy in this study provide a preliminary attempt to develop taxonomy for health website quality criteria from consumers’ perspectives. Expansion of this general taxonomy of health website quality criteria to validate quality dimensions, attributes, and drivers (website features) should be further explored.

Second, the sample only included individuals with healthcare backgrounds and business professions and within a certain age span. Although these represent two large groups of healthcare consumers, not all types of potential healthcare consumers in varying backgrounds are represented. In addition, future work may choose consumers using other characteristics, such as age to enrich the full picture of consumers’ perspectives on health and healthcare website evaluations.

Furthermore, the current study specifically distinguished consumers based on healthcare and business backgrounds to explore differences in quality attribute perspectives. Results of previous
studies also beget the questions of 1) whether there may be differences amongst physicians and other health experts as well as between health experts and general consumer; 2) whether any form of healthcare training could be a reason for differences in the quality criteria for the website evaluation and if the differences are the results of different values or different interpretations of the quality attributes amongst physicians and other healthcare experts as well as between healthcare experts and general consumers.

In addition, this study examined the importance rankings of health and healthcare website quality attributes based on generic conceptualizations from two consumer groups. It is unclear whether or not the individuals and/or groups would rate specific health websites differently. Further studies can seek answers to this question. Exploring a specific and popular health website, like WebMD, could determine if the differences in perspectives are consistently applied when consumers actually are charged with rating websites. Comparison of rankings and exploring statistically significant differences for specific websites could also establish whether specific websites can respond to the needs and qualitative criteria of varying consumer groups.

7. Conclusion

This study provides an initial step in the development of a healthcare website quality criteria taxonomy based on consumer perspectives as end users of health websites. The taxonomy is based on quantitative rankings with initial exploration of the components that drive these rankings provided through qualitative analysis.

The study also is among the first of studies that defines and explores ratings and rankings of health and healthcare website attributes by two distinct groups of health consumers, in this case those with healthcare backgrounds and those with business backgrounds. Differences in ratings seemed to be particularly pronounced regarding the attributes of Relevancy of Information attribute and additional attributes in the Confidence category in the resulting taxonomy. Further analysis of qualitative data indicated that the business and healthcare groups seem to possess differing expectations of what they are looking for in these specific attributes that require consideration in web site design. Though some differences were found, results also indicates that significant commonalities exist in importance ratings and relative ranking of attributes that can establish the foundation for the potential for health and healthcare websites that can satisfy both groups.

Understanding consumer perceptions of the quality attributes should guide developers and assure their websites provide contributions of value that meet end user needs. Further study into these attributes and the robustness of the criteria taxonomy can establish practical guidelines that will enable designers to meet the needs and expectations of various groups comprising health care consumers.

8. References


