An Exploratory Study of Users’ Preferences and Use of Sources for Seeking Health Information

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Abstract

Studies have surveyed college students’ use of health information sources. But still little is known about the cognitive processes involved in their source evaluation and selection. To explore this topic, we conducted in-depth interviews with twenty students about their use of sources for specific health-related incidents in their lives. The results suggested that search engines, health websites, doctors, and parents were the most important sources, while social media and libraries were the least important ones. The participants cared about the quality and accessibility of information, but also inclined to use sources that they are familiar and comfortable with, sources that match their interests, or sources that are personal and engaging. In actual information seeking, some participants relied only on search engines, while more used multiple sources and involved family, friends, or doctors in the process. The results’ implications to the design of health websites and health education programs were discussed.

Keywords: consumer health informatics, information behavior, information sources, Web 2.0, social media

Introduction

According to the American College Health Association’s (ACHA) most recent National College Health Assessment (NCHA), 92.7% of the students sampled reported their health as being “good”, “very good”, or “excellent”. Nevertheless, 55.3% of students also reported being treated or diagnosed for a specific disease or condition by a health professional in the last 12 months and 25.0% had some form of a chronic condition or disability (American College Health, 2011). The survey, conducted by the Pew Research center, also reported that 71% of young adults (aged 18-29) look online for health information, the highest among all generations (Fox, 2011). Furthermore, searching for health information is the third most popular online activity for this group, after email and search engine use (Zickuhr, 2010). These results suggest that college students, although generally healthy, have a high demand for health information, and are diligent in seeking health information.

Purposeful information seeking always begins by selecting sources (Wilson, 1999). Traditionally, college students refer to various sources for health information, such as healthcare professionals, family and friends, TV, newspapers, magazines, and the Internet (Kwan, Arbour-Nicitopoulous, Lowe, Taman, & Faulkner, 2010). In recent years, the rapid development of Web 2.0 and mobile technologies led to the emergence of an array of new forms of sources, such as online communities, social Q&A sites, and social networking sites, where consumers share information and personal stories and construct knowledge (Eysenbach, Powell, Englesakis, Rizo, & Stern, 2004). As a population at the forefront of embracing and adopting new technologies, college students’ information environment for health has been significantly expanded; nevertheless, challenges are present when trying to use and interpret information in these new media (Kim & Sin, 2011). In any context, source selection can have an important effect on the success of an information searching attempt; this effect can have severe ramifications when the topic is related to personal health information. Thus, it is important to understand, in the current more complicated information environment, what sources college students use and prefer, and how they evaluate the sources.

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Studies have been conducted to explore this topic; however, many were self-administered surveys and, often, only focused on a particular source (such as the Internet) (for e.g., Escoffery, et al., 2005; Kwan, et al., 2010). Such studies shed light on students’ preferences of sources, but are limited in revealing how they actually use and evaluate these sources. Furthermore, few studies examined how students view the emerging new media as sources for health information. In order to achieve a more comprehensive understanding of college students’ source preferences and use in this increasingly more diverse and dynamic information environment, we adopted the in-depth interview technique to reveal criteria used by them to select and use different sources to address a particular issue of interest. Specifically, the following research questions were explored:

1. What sources do college students use when looking for health information?
2. What criteria do they use to select sources?
3. How do they use the sources to address specific health situations?

**Background**

Selection of proper information sources precedes successful information seeking. Thus, source preference and use has been an important research topic, the understanding of which is deemed important for understanding information seeking behavior as well as designing effective health promotion programs and health websites. To understand people’s preferences and use of information sources, several conceptual frameworks were developed in both Information Science and Communication Studies, such as information field (Johnson, Case, Andrews, Allard, & Johnson, 2006), information horizons (Sonnenwald & Livonen, 1999), and information zones (Savolainen, 2008). A common assumption of these frameworks is that everyone is situated in a virtual information environment. This environment encapsulates an array of sources, such as information retrieval tools, the Web, books, magazines, and social networks, such as family, friends, and colleagues (Sonnenwald, Wildemuth, & Harmon, 2001). These sources cluster into different zones, dependent on their importance to the users (Savolainen, 2008). Furthermore this environment serves as a starting point for information seeking and constitutes part of the context that fosters or constrains people’s access of information (Wilson, 1981).

College students are active consumers of health information (Fox, 2011). For this group of users, major topics of interest included fitness/exercise and diet/nutrition, life-style choices such as alcohol, smoking, and illegal drug use, as well as sexual health, such as STDs, contraception, and dating violence (Baxter, Egbert, & Ho, 2008; Buhi, Daley, Fuhrmann, & Smith, 2009; Escoffery, et al., 2005; Hanauer, Dibble, Fortin, & Col, 2004). Students were also interested in topics such as cancer, diabetes, and mental health, especially when family histories indicated a high risk for these diseases (Escoffery, et al., 2005).

Numerous studies have examined where college students receive health information. It is widely recognized that, in this digital age, the Web has become a leading source for this group. The percentage of students who used the Web for health information increased from 73% in 2005 to nearly 79% in 2010 (Escoffery, et al., 2005; Kwan, et al., 2010; Percheski & Hargittai, 2011). In most studies, the Web was treated as one entity and few attempted to examine roles that different platforms, such as search engines, health websites, and social networking sites, play in students’ health information searching (Buhi, et al., 2009). Although being the most prevalent source, the Web is not the most frequently used one, as students had doubts about the credibility of information on the Web (Escoffery, et al., 2005). Human sources seemed to be a preferred source. Studies consistently reported that family and friends were the most frequently used sources, followed by medical professionals, such as doctors and nurses (Percheski & Hargittai, 2011; Siebert, Wilke, Delva, Smith, & Howell, 2003). These sources were also cited as more credible than the Web (Vader, Walters, Roudsari, & Nguyen, 2011). Other human sources included health educators, romantic partners or spouses, and acquaintances (Baxter, et al., 2008). Although, in many domains, the Web has challenged the use of traditional mass media, such as TV, radios, and magazines, these sources are still used by more than half of the students for health information (Kwan, et al., 2010; Percheski & Hargittai, 2011).

To gain an in-depth understanding of students’ source preferences and use, it is necessary to understand how they evaluate the sources. Nevertheless, most existing studies focused on examining criteria that cross-sectional consumers employ to evaluate health information on the Internet. These studies consistently suggested that consumers evaluate health information by appraising both the quality and characteristics of information, such as authoritativeness, trustworthiness, currency, and readability, as well as the design attributes of the websites, such as system usability, interface appearance, and
information organization and presentation (Cline & Haynes, 2001; Eysenbach & Köhler, 2002; Morahan-Martin, 2004). Based on observations of fifteen menopausal women searching for information, Silience, Briggs, Fishwick, & Harris (2004) further proposed a staged model of online health information evaluation. At the first stage, users quickly reject certain websites, mainly dependent on design factors (e.g., layout, navigation aids, and interactive features); at the second stage, users meticulously select websites to seek information. This selection is mainly dependent on the appraisal of content factors (e.g., accuracy, topic coverage, and readability).

Although the results from the reviewed studies were not specific to college students, they may also apply to this group. For example, in one study that we were able to found, Escoffery et al. (2005) surveyed 743 college students on their use of Internet for health information and found that most of them ranked attributes associated with information, specifically accuracy, credibility, currency, comprehensiveness, easy of understanding, and readability, as important factors for judging a health website. The usability of the sites was also an important factor, while website appearance, use of multimedia, and interactivity were reported as less important. In two additional surveys, students were simply asked to rank the believability of a set of health information sources (Kwan, et al., 2010; Vader, et al., 2011). Another survey-study reported that many students lacked the ability to judge the trustworthiness of health-related websites and articles (Ivanitskaya, O’Boyle, & Casey, 2006).

Based on the review, it is apparent that most existing studies of students’ evaluation of health information sources relied on survey instruments. This method has limitations. First, the imposed nature of surveys limits participants’ answers to the criteria provided and it is difficult to capture their interpretations of each criterion. Second, limited information about the context in which the criteria were used can be captured by surveys. Thus, in this study, we adopted the in-depth interview technique, intending to understand, from the students’ perspective, what criteria they use to evaluate and select sources and how they used the sources in specific incidents. Furthermore, most existing studies focus on students’ evaluation of health websites. In this study, we extend our exploration to include other sources students are exposed to, including human sources, traditional mass media channels, social media technologies, government social services, and libraries. A more comprehensive and in-depth understanding of students’ preferences and use of various sources is needed as their health information environment becomes unprecedentedly diverse and complex.

Methods

Twenty undergraduate students from a major university in Texas were interviewed about their use of information sources for seeking health and wellness-related information. These participants were recruited through an email message sent to a campus-wide mailing list. A screening survey was distributed to those who expressed interest in the study to collect demographic information and experience related to searching for health information. The screening was in place to ensure that participants had seriously searched for health information for themselves or for people they cared about. We selected the first twenty participants who met the criteria.

The interviews were one-on-one and took place in a private lab or office. The interviews were conducted from January to April of 2012. At the beginning of each session, a brief introduction of the study was given and the participant was then asked to review the consent form. After giving the consent, each participant was presented with a list containing sixteen health information sources, including family members, friends, someone else with similar conditions, doctors or other healthcare professionals, government agencies, web search engines, health websites, and Web 2.0 sources, such as Wikipedia, blogs, social networking sites, and YouTube. The list was generated based on a review of the literature on consumer health information sources (for e.g., Fox, 2011; Kwan, et al., 2010), as well as our interest in students’ use of Web 2.0 sources for health information. Each participant was asked to select sources that they had used for health information. Then he/she was asked to rank each source on a 0-3 scale in terms of their perceived importance of the source for their health information seeking: 3- very important (primary), 2- important (secondary), 1- less important (tertiary), and 0-not important (not-used). The interviewer also asked the participant to describe his/her use of each selected source and explain the ranking assigned to the source. Then, the participant was asked to recall a most recent or most memorable experience of seeking health information and describe the information seeking process, specifically, sources used, the reasons for choosing the sources, and strategies of using the sources. At
the end of the interview, the participant was asked to draw a timeline view of the sources that he/she had used for this incident. Each interview lasted approximately 60-90 minutes.

Users’ demographic information, sources used, and sources ratings were analyzed using descriptive statistics. The interviews were transcribed and analyzed using a qualitative content analysis method by following an open coding process (Glaser & Strauss, 1967). The coding unit was a theme, specifically the criterion that the participants used to select and evaluate each source. The data analysis was assist with Nvivo software. A second coder coded 50% of the transcripts and the percentage agreement reached 89.2%.

Results

Characteristics of the Participants and Health Issues of Interest

Of the twenty participants, twelve were females and eight were males. Their ages ranged from 18-24 years old (Mean = 19.8; S.D. = 2.0). Their experience with searching for health information ranged from 1-10 years (Mean = 3.94; S.D. = 2.4).

The topic of interest helps shape users’ preferences and use of sources (Savolainen, 2008). To place college students’ source preferences into context, we asked the participants to describe a specific health information seeking incident. They were also encouraged to talk about the topics that they searched for when they ranked and described the use of the sources. The topics mentioned by the participants roughly fell into the following categories:

- Exercises, fitness, and physical training, such as workout tips and methods; use of supplement (e.g., creatine) for powerlifting.
- Healthy food and diets, such as calorie and nutrition of food (e.g., salad, fruits, and vegetables).
- Weight loss and weight control
- Physical injuries, such as ankle injury, Morton's neuroma, back injury, knee injury and treatments of the injuries, such as physical therapies
- A particular health concern (symptoms or conditions), for example, do I have ear infection? What are the bumps around the wrist and knuckles that itched a lot? What are the large rashes along my thighs and lower back? Why am I sick after returning from a vacation? Why do I have unusual menstrual bleeding?
- Mental health, such as stress and depression
- Preventative health, for example, how to protect myself from contracting swine flu and when to take seasonal flu shots

Similar to previous findings, the most popular topics of interest to the participants were exercise and healthy diets, with more than half reporting having searched for these topics. The results also reflected that undergraduates had a wide range of other health-related requests and concerns, as demonstrated in the list. One participant also mentioned searching for information online and discussing diabetes with family members because of a family history of the disease. It seemed participants’ searches for health information were motivated either by a personal interest (e.g., exercises, diets, and diabetes) or by a need to solve a particular health concern (e.g., what are these rashes?).

Sources Used for Health-Related Information

The participants’ health information horizon varied. Among the 16 sources provided, each participant had used eight to twelve (Mean = 10.2; SD = 1.5). Table 1 lists the participants’ ranking of each source in terms of their evaluation of the importance of the source for their health information seeking. The 16 sources were grouped into 6 major categories.
As shown in the table, the participants ranked traditional Internet sources, namely, Web search engines and health websites, as highly important sources for health information. The most widely referred to Web search engine was Google; only one participant mentioned Yahoo! and one mentioned Bing. The health websites mentioned by all of the participants was WebMD; others included the CDC website, Mayo Clinic, the FDA website, Yahoo! portal, and Dr. Oz’s website. Consistent with findings from many previous studies, doctors and other healthcare providers were ranked as one of the most important sources for health information. The participants’ social ties, particularly family members and someone with similar conditions, mostly friends, were also deemed important. Although traditional medial sources, namely printed materials (books, newspapers, magazines, and pamphlets) and mass media (TV), received a lower ranking, they were still favored. Specific print materials mentioned by participants included Cosmo, Vogue, Women’s Health magazine and pamphlets in doctors’ office; TV programs mentioned included CNN, Dr. Oz, and the Martha Stewart Show.

College students are early adopters of various Web 2.0 technologies. Nevertheless, when it comes to look for health information, Web 2.0 sources were not favored and were also underused. Among various forms of social media, Wikipedia was considered as the most important source for health information. The remaining sources, including blogs, online communities, social networking sites, and RSS feeds, were used by less than half of the participants, and few considered them as important sources. Those who used these new media mentioned the following specific sites: bodybuilding community, Kimberly Snyder’s blog, and Yahoo! Answers. Only a few participants had used government-run social services; subsequently, this source was ranked low in its importance. Libraries were ranked as the least important source on the list, with 75% of the participants not using libraries for health-related information.

In addition to selecting and ranking the sources used from the list, participants were asked whether they had used sources not on the list. Close to half mentioned the University Health Service (UHS) as a source and one mentioned nutrition labels as a source of calorie and nutrition information.

<table>
<thead>
<tr>
<th>Sources</th>
<th>Mean</th>
<th>Primary</th>
<th>Secondary</th>
<th>Tertiary</th>
<th>Not use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Traditional Internet sources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web search engines</td>
<td>2.60</td>
<td>14</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Health websites</td>
<td>2.45</td>
<td>14</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Doctors or other healthcare</td>
<td>2.45</td>
<td>13</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>providers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Human resources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Members</td>
<td>2.25</td>
<td>10</td>
<td>6</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Someone else with similar</td>
<td>2.15</td>
<td>7</td>
<td>10</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friends</td>
<td>1.85</td>
<td>3</td>
<td>11</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Traditional media</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Books/newspapers/magazines/pamphlets/other printed material</td>
<td>1.55</td>
<td>3</td>
<td>7</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Television</td>
<td>.90</td>
<td>1</td>
<td>3</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Wikipedia</td>
<td>1.60</td>
<td>4</td>
<td>9</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Blogs</td>
<td>.90</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td><strong>Web 2.0 sources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support groups/online communities</td>
<td>.45</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Generic social networking sites</td>
<td>.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. Twitter, Facebook)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSS feeds/email newsletters</td>
<td>.45</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>YouTube</td>
<td>.60</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td><strong>Government services</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Libraries</td>
<td>.45</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>15</td>
</tr>
</tbody>
</table>

a. 3- very important (primary), 2- important (secondary), 1- less important (tertiary), and 0-not important (not-use)
b. Number of participants
**Criteria for Source Selection and Use**

To understand why users select and use particular sources over others, we asked the participants to describe reasons for their source selection decisions. The participants mentioned altogether fourteen unique criteria used in selecting and using sources for health-related information. These criteria were collapsed into six major categories pertaining to: the characteristics of content of a source, the characteristics of the source itself, the familiarity of the source to the user, the user’s personal interest, the user’s emotional reactions to the source, and social norms. The six categories can be further classified into two sets: the first two categories are related to the characteristics of sources and source content, while the rest were related to the characteristics of the user.

**Set 1: Criteria related to the characteristics of sources and source content.** Among all the criteria, the majority (10 out of 14) were related to the perceived quality and characteristics of the sources and source content, as shown in Table 2a.

**Table 2a**  
*Source selection and use: Criteria related to the characteristics of sources and source content*

<table>
<thead>
<tr>
<th>Categories</th>
<th>Criteria</th>
<th>Description</th>
<th>No. of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source content characteristics</td>
<td>Authoritativness</td>
<td>Whether the content of a source is truthful or correct (when it is human source, it refers to the perceived authority of the human)</td>
<td>18 (90.0%)</td>
</tr>
<tr>
<td></td>
<td>Visual presentations</td>
<td>Whether the content is presented in a visual format</td>
<td>10 (50.0%)</td>
</tr>
<tr>
<td></td>
<td>Specificity</td>
<td>Whether the content of a source is specific or general</td>
<td>5 (25.0%)</td>
</tr>
<tr>
<td></td>
<td>Easy to understand</td>
<td>Whether the content is easy to understand</td>
<td>5 (25.0%)</td>
</tr>
<tr>
<td></td>
<td>Currency</td>
<td>Whether the content is up-to-date</td>
<td>2 (10.0%)</td>
</tr>
<tr>
<td>Source characteristics</td>
<td>Accessibility</td>
<td>Whether a source is available or easy to access</td>
<td>20 (100%)</td>
</tr>
<tr>
<td></td>
<td>Trustworthiness</td>
<td>Whether a source is integral in terms of motivation to be truthful</td>
<td>16 (80.0%)</td>
</tr>
<tr>
<td></td>
<td>Usability</td>
<td>Whether a source, including the technological platform, is easy to use</td>
<td>16 (83.3%)</td>
</tr>
<tr>
<td></td>
<td>Similarity</td>
<td>Whether a source (mostly human) is similar to the user in terms of health condition and interest</td>
<td>14 (70.0%)</td>
</tr>
<tr>
<td></td>
<td>Scope</td>
<td>Whether a source is health information specific or includes many other topics</td>
<td>10 (50.0%)</td>
</tr>
</tbody>
</table>

Source accessibility and the authoritativeness of the content were the most widely used criteria, followed by trustworthiness and usability. Sources were more *accessible* when they were always available (e.g., search engines and online communities), within reasonable physical distance (e.g., libraries and parents), and can be reached within an acceptable time frame (e.g., you have to make an appointments to see a doctor; friends were with me at the moment). *Authoritativeness* involves the judgment of the truthfulness and accuracy of the information (O'Keefe, 2002). Sources were authoritative when perceived as having reliable medical knowledge (e.g., doctors, sometimes parents and friends, and Mayo clinic websites) or provided references to other sources for validation (e.g., Wikipedia). *Trustworthiness* refers to judgments concerning the motivation of a source to be truthful or biased (O'Keefe, 2002). Sources were trustworthy when they were perceived as being genuinely interested in one’s health (e.g., family and friends) and lacked monetary incentives (e.g., TV programs). *Usability* refers to whether a source is easy to use. Here are several examples:
“Because I mean, I’m not oh where I used to live and didn’t have a library. So I couldn’t really just walk to one. I don’t think they’ve got any health or fitness related type in the libraries nearby on campus.” – [Accessibility]

“[Wikipedia], a lot of people put on their knowledge, there are tons of references. I would say it is fairly valid because most people don’t like, you know, edit it just for the heck of it. There is always like outside links to science, articles you can read. I would consider it good quality.” – [The authoritativeness was established by providing references to other publications for validation]

“I used to watch [health-related TV programs], but there were so many. And I was thinking like the main point of advertising is to sell their products so can I trust them? I mean, because they’re very biased towards their product. They want to sell their products so I don’t think they’re a very reliable source.” – [Trustworthiness: TV ads are motivated by profit gains]

“I feel like a library will be a lot harder to find the information I am looking for in entire books but I feel like in WebMD it could probably easier, it more easily gets the information that you need and probably quicker.” – [WebMD is better than a library in its usability]

The other source and source content-related criteria used by more than half of the participants included a source’s (mainly human) similarity to the user in terms of body shape, health conditions, or health interests; visual presentations of the content (mainly in videos and images), and the scope of the source. The following quotes illustrate these criteria:

“Well like, I would listen to like, pertaining to exercise and what to eat and how to like, like build myself better. I do listen to people that are like somewhat the same body type as me.” – [Similarity]

“If something interests me say like cancer I will look it up on Wikipedia and read all about it. I like images and everything.” – [Visual presentation]

“Type in a few keywords [in Google] and websites are coming up. That one looks good. [It is] so much easier to use, lots of diversity, [I can] compare a lot of stuff.” – [Scope]

The rest of the criteria in this group were mentioned by only several participants, including included the specificity of information (e.g., “WebMD is more specific [than Wikipedia]”) and whether the information is easy to understand (“I see what I don’t really understand I go to Wikipedia for an easier description”). Only two participants expressed concerns about information currency by pointing out that he/she used online communities for health information because they are more updated.

Set 2: Criteria related to the user: Familiarity, personal interest, affection, and social norms. The second set of criteria are not related to the features of the sources; rather they are related to the user’ characteristics, including their familiarity to the source, personal interest, affections or emotions involved, and perceived social norms, as shown in Table 2b.

Table 2b
Source selection and use: Criteria related to the characteristics of the user

<table>
<thead>
<tr>
<th>Categories</th>
<th>Criteria</th>
<th>Description</th>
<th>No. of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familiarity</td>
<td>Familiarity/Previous experience/Habits</td>
<td>Whether a source is familiar to the user</td>
<td>15 (75.0%)</td>
</tr>
<tr>
<td>Personal interest</td>
<td></td>
<td>Whether the content of a source is of interest to the user, particularly whether it is engaging or entertaining</td>
<td>15 (75.0%)</td>
</tr>
<tr>
<td>Affections</td>
<td></td>
<td>The selection of a source is dependent on the emotional reactions of the user.</td>
<td>6 (30.0%)</td>
</tr>
<tr>
<td>Social norms</td>
<td></td>
<td>Whether use of a source complies with generally accepted social norms</td>
<td>3 (15.0%)</td>
</tr>
</tbody>
</table>
Familiarity of a source was mentioned by fifteen participants as a determinant in their selection and use of a source. Indicators of familiarity included whether the user was aware of the availability of health information in the source, whether he/she had previous experience with the source, and whether he/she had a habit in using the source (e.g., "used to Google"). Here are two examples:

“I honestly did not know [blogs, support groups, and online communities] existed for health related material.” – [Lack of familiarity to these sources]

I use those sources [search engines] for pretty much, I use them every day pretty much. And I use them for school. So, I think I know how to work them. It’s easier for me. – [Familiarity of Web search engines]

Additionally, fifteen participants pointed out personal interest as a factor in guiding their source consumption, specifically, whether he/she was interested in the content of the source and whether the presentation format was engaging or entertaining. This criterion was mostly used to determine whether the user was going to pay attention to sources in their current environment, such as TV programs, magazines, newspapers, pamphlets in doctors' offices, blogs, and Facebook, and where users often do not actively seek health information, but passively monitor the content. Here is an example:

“Like Dr. Oz, if I'm home in the afternoon and just working on my homework, and he comes on and says eat chAse berries because they'll do all this for you. Then I'm like that's interesting, or if he comes on with something that I'm like thought of. I have dealt with that in the past. What does he have to say about it? Or if it's new research that has been found out.” – [Whether this TV program matches with my personal interest]

Six participants mentioned affections as a factor that impacts their use of a source. One participant commented that he/she did not tell her mom certain health concerns because she did not want her to "get worried." One felt "comfortable" talking to his/her friends and another felt "comfortable" talking with people with similar conditions about very private health concerns on an online forum. Furthermore, one participant expressed comfortableness in talking with a doctor in the University Health Service because she listened and was "genuine" and "concerned." Three participants cited social norms as a factor preventing them from using social networking sites, particularly Facebook and Twitter for health information; one participant commented: "I don't go to those websites for health questions. It's too public."

It is worth noting that the selection of a source is not always a result of the consideration of one criterion. Sometimes, it involves deliberate weighting of multiple criteria. For example, authoritative sources might be difficult to access (e.g., visiting doctors requires appointments); authoritative sources might not fit one's personal interest (e.g., not comfortable with the doctor in the UHS); sources with an appropriate level of specificity might not be easy to understand (e.g., WebMD content is specific, but not as easy to understand as it is in Wikipedia). The following quote illustrates a case of source evaluation where both accessibility and accuracy of information were weighted:

“When you Google search you end up at blogs sometimes. So, I looked at some of those. But, I guess accuracy is a little bit of concern. Like I don't trust it as much, I guess, as I would some of the other sources.”

Use of Sources in Seeking Information for Specific Health Situations: A Process View

The criteria identified in the previous section helped illuminate students’ cognitive appraisal of health information sources, but shed limited light on the use of source as a process. Source selection is an integral part of information seeking, thus is a dynamic process. To understand how sources are actually being used, pathways, that is, the sequence in which sources were being used to address specific health situations were analyzed based on the critical incident interviews. Two major patterns were identified: (1) Search engine-centered information seeking, and (2) Multi-source information seeking. Figure 1a and 1b show an example of each pattern. The figures were produced based on the participants’ drawing of their process of searching information for a particular incident.
Figure 1a illustrates the process that a participant followed to search for information about unusual menstrual bleeding for his girlfriend. He began with Google by typing in keywords and then examined a few results one by one. Google was chosen because he was used to the site and the health matter of concern was very personal. He stayed with Google because he believes that all results returned by Google were relevant, as he commented “that’s what Google does, it presents articles that were all relevant to what your keywords are. So, I didn’t want to stray away from that.” Figure 1b demonstrates a multi-source pattern for seeking health information. This participant was trying to find out whether the symptoms that he/she had signified a STDs. He/she began with a Google search (because of easy access and because using Google is a habit), moved onto making a phone call to a call center (gave it up because he/she felt it was commercially motivated), had a brief conversation with a very close friend to hear about his/her opinions, followed by another round of online search, and then went to his/her father, who was a doctor. This multi-source pattern has also been noted in earlier research (Pescosolido, 1992).

Three participants demonstrated the first pattern while the remaining demonstrated the second pattern (with varied number of transitions between varied numbers of sources). Among the participants, eight began their search from a human source, respectively, parents, cousin (doctor), coaches, and friends; seven began from Google; and four began from WebMD. Google was the source that used by all the participants and it was always used as the first or second source in the search process. Additionally, fifteen participants (75%) involved various human sources (father, mom, cousin, coaches, friends, and doctors) at different stages in their information seeking process. It seemed that the participants’ actual use of the sources, particularly search engines and human sources, matched with their ratings of the importance of the sources. Nevertheless, the sequence in which sources were deployed and the reasons why users move from one source to another requires further exploration.

Discussion and Conclusions

This study examined how undergraduate students evaluate and use various sources for health information. The findings suggested that students preferred the Web, particularly search engines and health websites, and human sources for health information, which is consistent with previous research (Case, Johnson, Andrews, Allard, & Kelly, 2004; Fox, 2011; Kwan, et al., 2010; Pennbridge, Moya, & Rodrigues, 1999). Nevertheless, this study contributes to the understanding of college students’ health information seeking behavior by revealing how they use and perceive Web 2.0 sources for health information. The results suggest that, although embracing social media technologies in general, college students are not receptive to using these technologies for health purposes (Fox, 2011). Many were not even aware that these sources contained health information. For those who were, they were concerned about the quality of information. Among these sources, Wikipedia seems to be an exception. Students used Wikipedia because it was often ranked high in Google search results, they trusted the accuracy of
the information resulting from the collective edit process, and the information was easy to understand. In another study, Wikipedia was also reported by college students as a credible source for sexual health information (Buhi, et al., 2009). Only a couple of participants expressed a favorable view of social media, pointing out that information in social media is personally relevant and up-to-date.

The second contribution of this study is that, in addition to corroborating previous research on the significant impact of the authoritativeness, accessibility, trustworthiness, and usability of a source on students’ evaluation of health information sources (e.g., Cline & Haynes, 2001), it identified two additional source-related factors: sources’ similarity to users (particularly human sources), as well as, the visual presentation of information. Moreover, it identified a set of criteria related to users’ characteristics, including familiarity with the source, personal interests, affections, and social norms.

The identification of these criteria suggests the following implications for health website design and health education: (1) health websites or social media sites should support users to find people similar to themselves or with similar interests, and be able to accommodate users’ personal health interests. For generic social networking sites, like Facebook, it should allow friends with similar health interests to form groups and communicate privately so as to create a safe and comfortable environment for health information exchange; (2) websites should effectively integrate image and videos into their collections to tailor to users who need procedural information on how to do something (e.g., workout) or to those who are visual learners; (3) to promote use of credible health information sources; it is necessary to increase students’ familiarity with these sources. Universities, university health services, as well as libraries should take up a role as health educators to improve students’ health literacy. Methods like creating health literacy courses in universities, and providing health information search guidelines in libraries could be used. Universities health services could expand their influence by participating in social media and become more connected with students; (4) public health campaigns on mass media should continue to be strengthened to impose positive influence on students’ health and health behaviors, because, as the results suggested, college students also passively monitor their information fields, particularly TV, magazine, newspapers, and Facebook, to receive information of personal interest; (5) health website design should not only be user-centered, but also take users’ emotions and affections into consideration (Norman, 2003), as it is necessary to create an engaging and comfortable virtual environment for users.

Most existing studies on source selection and use in health information seeking utilized the survey method. An inherent weakness of this method is that it examines source selection out of the context of information seeking as a process and operationalize it as one-time decision-making. Thus, the third contribution of this study is that it provided a pathway/process view of students’ use of sources in real information seeking scenarios. Two source use patterns, a search-engine-centered pattern and a multi-source pattern, were identified. The former seems to be a reflection of the least-effort principle, which asserts that people weigh the accessibility of a source over its quality (Anderson, Glassman, McAfee, & Pinelli, 2001); while the latter seems to reflect a collective influence of the cost-benefit analysis, which weighs source quality over accessibility (Ashford, 1986), and the least-effort principle, because in the second pattern, participants weighed both source quality and accessibility (Agarwal, Xu, & Poo, 2011). In future studies, it is worthwhile to examine why users select multiple sources and why they move from one source to the other.

This study is exploratory. In future studies, we will also add the University Health Services (UHS) to the source list, as close to half of the participants mentioned it in the study. Previous research suggested that the criteria students used for selecting sources could be influenced by the topic of interest. For example, potentially embarrassing topics such as sexually transmitted diseases (STDs), contraception, and pregnancy are cited as reasons for seeking information online where anonymity can be maintained (Gray, Klein, Cantrill, & Noyce, 2002). Therefore, in future studies, it is worthwhile to examine the impact of topics on students’ evaluation and use of various sources, which could effectively inform both health education and health website design.
References


