Promote physical activity among college students: Using media richness and interactivity in web design

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ABSTRACT

Recently with widely available access, the web has emerged as a medium for new interventions. However, as yet, little is known about what makes some websites more effective than others. This study investigated an approach to developing websites that utilized two media characteristics – media richness and interactivity – to promote physical activity among college students. Four forms of websites were developed and tested in a 2 × 2 between-subject experiment (high vs. low richness; high vs. low interactivity) that was conducted among 205 participants. Overall, media richness had a significant main effect on college students' intention to visit the fitness center while interactivity influenced the likelihood they would recommend it. Although media richness did not have a significant main effect on recommendation, a significant interaction effect was observed that rich media led to higher recommendation intention when interactivity level was low. In addition, knowledge, attitude and trustworthiness of the fitness center mediated the effects of media richness and interactivity on behavioral intentions. These findings support the efficacy of utilizing these media characteristics to design web-based health interventions promoting college students' physical activity.

1. Introduction

Physical inactivity is a significant public health concern because it is associated with higher risk of health problems, such as coronary heart disease, type II diabetes, and hypertension (Lambert et al., 2009). On the other hand, physical activity increases longevity and reduces health risks in cardiovascular outcomes, stroke, diabetes, and many types of cancer (Brown, Burton, & Rowan, 2007). Promoting physical activity helps reduce illness and death linked with chronic diseases, which in turn may help reduce health insurance cost (Lambert et al., 2009). Despite the importance of physical activity, the majority of adults in U.S., particularly young adults in college, still remain physically inactive. Recent surveys indicate that one third of college students (35%) are overweight or obese (Burke, Reilly, Morrell, & Lofgren, 2009); 40–50% of college students are physically inactive (Keating, Guan, Piñero, & Bridges, 2005); those who do engage in physical activity also do not meet the CDC recommendations for adequate amount of physical

activity – minimum of 30 min moderate-intensity aerobic physical activity for five days a week or a minimum 20 min of vigorous-intensity aerobic physical activity for three days a week (Huang et al., 2003).

Given that health behavior patterns established at a younger age are likely to persist throughout adulthood (DiLorenzo, Stucky-Ropp, Vander Wal, & Gotham, 1998), it is important to develop effective strategies to encourage physical activity of college students by identifying their behavioral patterns. Among many sedentary behaviors such as reading or television watching, in a study of young Australian adults, computer use was found to be highly associated with physical inactivity (Fotheringham, Wonnacott, & Owen, 2000). College students are reported to be heavy users of the Internet that 94% (nearly all students) use the Internet for at least one full hour every day, that is, more than seven hours per week (Jones, Johnson-Yale, Millermaier, & Perez, 2009). Compared to the 2002 Pew Internet & American Life Project report (Jones, 2002), which reported 74% of college students using the Internet for four hours per week, both the Internet use prevalence and the amount of time spent on the Internet have increased significantly. Notably, the amount of time most students devote to studying (i.e., 62% of college students reported studying for no

more than seven hours per week) is less than their Internet use time (Jones, 2002). These reports show college students' typical behavioral patterns – sitting in front of the computer, actively clicking a mouse, interacting with information online, but physically sedentary, which is the typical image of 'mouse potato' (McFedries, 1996; Sundar, 2013). These college students' behavioral patterns – less time doing physical activity and more time online – imply two important points: (1) it is urgent to develop new tactics for facilitating college students' physical activity, and (2) it shows the potential of the use of the Internet for attracting college students to initiate physical activity such as the use of on-site fitness center.

Many studies found the Internet very effective in improving college students' healthy behaviors such as smoking cessation (e.g., Escoffery, McCormick, & Bateman, 2004), weight loss (e.g., Harvey-Berino, Pintauro, Buzzell, & Gold, 2004), or reducing alcohol use (e.g., Chiauzzi, Green, Lord, Thum, & Goldstein, 2005) and suggested technical guidelines on how to design effective web-based health interventions (e.g., providing personalized information, Brug, Oenema, & Campbell, 2003; providing customization options for users to control over contents, Revere & Dunbar, 2001). However, these studies focused on tailoring the intervention to meet individual preferences. The all-encompassing effects of website design (e.g., utilization of certain technical affordances) for a targeted population, especially college students, are scarcely studied. Studies on the effects of technical affordances on behavioral intention of a targeted population can provide important guidance for intervention development.

As a part of the efforts for designing web-based intervention programs targeting college students, this study examined the effects of two technological affordances – media richness and interactivity – drawn from MAIN model (Sundar, 2008) and investigated the psychological mechanisms (i.e., knowledge, attitude, and trustworthiness) underlying the relationship between the use of these affordances and college students' behavioral intentions (i.e., the use of on-site fitness center).

2. Theoretical frameworks

Does it matter how to deliver (or present) the information in terms of information evaluation and consequent behavioral outcomes of college students? A survey conducted by Fogg et al. (2003) showed that in assessing credibility of websites, about 50% of 2500 respondents addressed the 'design look' of the website and 28.5% commented the structure of the site's information (i.e., the organization of the information). Wathen and Burkell (2002) also argued in their multistage model that the design elements of interface such as interactivity or navigability are the first stage for judging the credibility of online information. Considering the fact that most college students have grown with computers and they are very familiar with visualized and interactive information, it may be particularly helpful to design effective websites that target college students.

Sundar's MAIN model (2008) provides the theoretical explanation for the effect of sheer presentation of these design elements of interface on information judgment. Why does the presentation of interactive tools or visual modalities such as 3D view influence information processing? MAIN model presents four technological affordances: Modality (M), Agency (A), Interactivity (I), and Navigability (N). According to MAIN model, each interface serves as a cue to trigger cognitive heuristics for users' information judgment (see Fig. 1). For example, when the information is presented in rich form such as video or 3D view, it reduces the noise or deception that might occur when presented in plain text, a less rich form (Sundar, 2008; Zhou, Twitchell, Qin, Burgoon, & Nunamaker Jr.,

2003). By triggering 'the realism heuristic', rich forms of information influence the judgment of information. That is, the more you see, the more you trust the information. Agency cue is the source of information. That is, the author of the information influences the credibility, triggering the 'authority heuristic.' For example, we trust the 'information about healthy tips' when it is delivered by a doctor more than the information delivered by an anonymous source. Interactivity tools trigger "activity heuristic" by allowing users to act and interact with the system. Higher level of interaction leads to greater specificity of the resulting content and in turn, influences users' information evaluation. Lastly, navigability cue (e.g., hyperlinks) triggers the 'browsing heuristic' and allows users to search relevant information and to 'elaborate' the information. In doing so, users experience maximized efficiency and low level of bias. Among the four affordances described in MAIN model, the current study examined two most cost-efficient affordances that are applicable in college fitness center websites – rich media and interactivity. In the following section, each affordance is defined and discussed.

2.1. Media richness

Media Richness Theory (or referred to as information richness theory) developed by Daft and Lengel (1984) suggests that communication media vary in their "richness" – the ability to convey information and enable users to communicate and exchange understanding. Media are described in MRT on a continuum of richness. In a study about communication in online classes, Newberry (2001) identified various media types from richest to leanest – face-to-face communication being the richest, threaded discussion being leanest. According to his argument, richer media contain more communication modes and social visual cues (e.g., gestures or immediate feedbacks) while less rich media have less cues or capacity to facilitate communication. Print newspapers, for example, deliver information through textual modality, while iPods utilize more modalities such as text, picture, audio, and video. Given that, print newspapers are considered as less rich media while iPods are considered as rich media. Like iPods, websites have high capability to use multiple modalities. Sundar (2000) found that college students who read text-plus-picture version of online news (i.e., rich media) evaluated the news more positively compared to students who read text-only version of online news. A number of researchers in marketing area also found positive effects of rich media on consumers' evaluations toward commercial websites (Coyle & Thorson, 2001) as well as the presented products on the sites (Simon & Peppas, 2004).

One of the popular and commonly used rich media is 3D view. 3D view of spaces enhances users' viewing experience of a space much like when they are physically in the space because they can explore it realistically from a variety of angles (Ganapathy, Ranganathan, & Sankaranarayanan, 2004). Li, Daugherty, and Biocca (2002) also found that 3D advertising enhanced presence – user's subjective sensation of "being there" in a scene depicted by a medium, – leading to consumers' product knowledge, brand attitude and purchase intention. Sundar (2007) suggests that the degree to which a given modality enhances presentation vividness and user feelings of presence in a mediated environment enables the modality to affect people's information processing and perception of the presented contents, and in turn, their actions. We may expect, as a result, "rich media", such as 3D view of a fitness center that features modalities of dynamic motion gives users a richer experience of the center, further leads to positive perceptions and attitudes toward the content, and eventually behavioral intentions, such as visiting the fitness center or recommending the center to friends. Therefore, we hypothesize that,