



Mobile wellness application-seeking behavior by college students—An exploratory study



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ABSTRACT

This research explored the mobile wellness application-seeking behavior of college students. In particular, it examined what sources students used to obtain wellness information, what wellness applications students used and for what purposes, how they learned about those applications, and what factors influenced their decision to choose a particular wellness application from multiple alternatives. The results indicated that students most often used websites as sources of wellness information, followed by mobile applications, family and friends, and then physicians. Students most often learned about wellness applications from search engines and application stores. Physicians were the least mentioned source of learning about mobile wellness applications. The most popular application type was calorie and activity trackers. In addition, when asked to rate the importance of various mobile application characteristics in their decision to select a particular wellness application, students rated usability-related characteristics the highest, followed by application cost and content quality. This study contributes to current research and practice in mobile wellness application design and the provision of mobile wellness services. In particular, it can inform application designers and intermediaries about which mobile wellness applications students use, and how students search for and select those applications.

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1. Introduction

Wellness is generally defined as a lifestyle or as a preventive approach to maintaining good mental and physical health (Myers, Sweeney, & Witmer, 2000; Wellness, 2012). Promoting wellness is essential for improving people's health and reducing health care costs. One wellness issue in particular—obesity—has been identified as one of the most challenging health crises today; it is a leading risk factor in several life-threatening diseases, such as diabetes, stroke, and cancer (Robert Wood Johnson Foundation, 2011; U.S. Department of Agriculture, 2010). Inadequate nutrition, a lack of exercise, and obesity have become problems among young people, including college students (Grace, 1997). A recent survey showed that more than 28% of U.S. adults aged 20 and over were obese, including almost 25% of adults aged 20 to 39 (Centers for Disease Control and Prevention, 2011). The rates of obesity have been particularly high in the southern states, including Florida (Robert Wood Johnson Foundation, 2011). Surveys have also shown that consumers' use of the Internet and mobile devices for health management has been increasing. Fifteen percent of Internet users have tracked their weight, diet, or exercise routine on the Web. Nine percent of adults who own a cell phone have used applications on their phones to manage their health, and adults aged 18 to 29 were the most frequent users of health applications (Fox, 2011).

Health communication research has shown that the use of Web health information systems and mobile applications leads to increased knowledge, positive health outcomes, and more proactive health behavior (Mamykina, Mynatt, & Kaufman, 2006; Stvilia, Mon, & Yi, 2009; Wantland, Portillo, Holzemer, Slaughter, & McGhee, 2004), and it may conserve resources (e.g., by reducing the number of emergency room visits; Krishna et al., 2003). More research is needed, however, to understand what makes health or wellness applications and information systems useful and usable, and how to promote and increase their use (Ahtinen et al., 2009; Cyr, Head, & Ivanov, 2006; Mattila et al., 2010).

Smartphone ownership has been growing steadily among all age groups. According to a 2013 Pew survey of smartphone ownership, 79% of the U.S. population in the 18- to 24-year-old age group own a smartphone, representing a 10% increase from a similar poll in 2012 (Smith, 2013). With increased ownership, smartphones have rapidly gained ground as channels for tailored health and wellness information distribution and as tools that individuals can use to monitor their health and wellness activities and to log, quantify, manage, and interact with this information. Mobile application stores (e.g., Google Play) list hundreds of thousands of mobile applications with tens of millions of downloads. It is not always clear, however, whether those applications are grounded in high-quality medical and kinesiology research or whether they perform according to the specifications listed in the descriptions (Furlow, 2012). In addition, concern has increased regarding the privacy protection of mobile application users, and governments have had to enact laws and guidelines to regulate the consumer data collection

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practices of mobile application developers (Guynn, 2013). At the same time, very little research exists on how consumers seek mobile applications on the Web and select from among them. More research is needed to determine how consumers perceive the usefulness and quality of mobile health and wellness applications; whether the consumers' perceived quality corresponds to the actual quality of the application; and whether the models, constructs, and heuristics of quality evaluation identified for Web health and wellness information resources are applicable to mobile applications. With multiple choices available for the same type of product from different providers, the discovery, selection, and recommendation of the "right" product become a challenge for consumers as well as for intermediaries such as search engines, application stores, and health portals.

2. Problem statement

As the number and variety of mobile wellness applications continue to grow, it is important to understand the wellness activities in which the population engages and their related mobile application-seeking behaviors in order to design effective application discovery and ranking mechanisms. To achieve that objective, this study explored the following set of research questions: (1) what sources do students use to obtain wellness information and services? (2) What mobile wellness applications do students use, and what are the purposes of using those applications? (3) How do students discover mobile wellness applications?

Product design and selection is a multidimensional optimization problem involving matching product and user characteristics (Green & Krieger, 1985; Konstan & Riedl, 2012). Quality, which is a product characteristic along with cost, is itself a multidimensional and contextual concept. It is usually defined as "fitness for use" (Juran, 1992). Some of the virtues or dimensions of software quality are accuracy, completeness, reliability, operability, portability, interactivity, security, and privacy. When direct, comprehensive evaluation of the quality of a product is not feasible (e.g., because of the high cost or users' lack of skills or knowledge), heuristics and credibility cues are used to assess quality indirectly (Stvilia, Gasser, Twidale, & Smith, 2007; Sundar, Knobloch-Westerwick, & Hastall, 2007). Furthermore, different product characteristics and heuristics may convey values of differing importance in users' product selection decisions (Stvilia et al., 2009). Hence, this study also investigates the following research questions: (4) what are some of the characteristics that influence students' decision to select a specific mobile wellness application from alternatives? (5) What is students' value or importance structure for those application characteristics?

3. Literature review

A need exists to evaluate and rank the alternative mobile wellness applications by their quality and value to the consumer. *Quality*, defined as fitness for use (Juran, 1992; Wang & Strong, 1996), is contextual and dynamic. Consumers' perception of quality as well as the priorities and value structure for quality may vary with consumers' age, level of education, and cultural background (Stvilia et al., 2009; Yi, Stvilia, & Mon, 2012). Furthermore, as new wellness services and products evolve, consumers' expectations for what constitute mobile wellness applications of higher or lower quality and their perceptions of what constitutes higher or lower quality of a particular type may change. Finally, as the number and variety of mobile wellness applications grow, consumers simply may not have the time or expertise to evaluate mobile applications through use and may have to rely instead on heuristic and indirect evaluations by using application descriptions and quality cues.

For search engines, online stores, review portals, and application developers to maintain their ranking algorithms and better align them with the consumers' perceptions of usefulness and quality, it is essential to identify the structure of consumers' decision making when selecting a wellness application. A significant body of literature exists on the

conceptualization of individual information quality criteria, general frameworks for quality criteria, and context-specific models of information product and service quality (e.g. Eysenbach, Powell, Kuss, & Sa, 2002; Fallis & Fricke, 2002; Frické, Fallis, Jones, & Luszko, 2005; Marschak, 1971; Saracevic, 2007; Stvilia et al., 2007; Tenopir, 1995; Wand & Wang, 1996; Wang & Strong, 1996). In addition, studies have been conducted on consumers' use of different heuristics to make quality and credibility judgments (e.g. Fogg, 2003; Rieh, 2002; Sundar et al., 2007; Yi et al., 2012), and researchers have investigated the effects of using specific system components on the efficacy of different types of websites. More recently, Sim and colleagues investigated the use of technical metadata and social cues when searching and selecting source code on the Web (Gallardo-Valencia & Sim, 2011; Sim, Umarji, Ratanotayanon, & Lopes, 2011).

Another relevant source of literature for this study is the literature on recommender systems (e.g., Konstan & Riedl, 2012), which includes the literature on recommender systems for mobile applications (e.g., Böhmer, Ganev, & Krüger, 2013). In addition to various features and metrics used to produce the recommendations, one important issue discussed in that literature is whether users are willing to contribute multicriteria ratings for products. Although Konstan, Riedl, Borchers, and Herlocker (1998) found that users were disinclined to provide multicriteria ratings, a different study by Adomavicius and Kwon (2007) showed that use of multicriteria ratings in a recommender system for movies could lead to better recommendations.

The dimensions of quality can be both intrinsic and relational, and quality can be assessed both directly and indirectly (Stvilia et al., 2007; e.g., assessing the reputation or credibility of the creator or author of the application). This process of indirect quality assessment by using various cues or "information scents" can also be conceptualized as sensemaking around the quality and value of the application (Pirolli & Card, 1999; Russell, Stefik, Pirolli, & Card, 1993). When multiple alternatives exist for the same type of product or service, the quality-based selection of an application becomes a search optimization task in a multidimensional search space where the dimensions are quality criteria and cost (Lesser et al., 1998). Visualization is often used to make sense of data and support decision making (Chi & Card, 1999).

Users use social cues and annotations—information scents—in predicting the quality or usefulness of information (Pirolli & Card, 1999). First, they should be able to notice and interpret these cues as relevant to their product selection decision (Fernquist & Chi, 2013; Fogg, 2003). In addition, different types of social cues may convey different levels of importance or persuasion value to the user and may thus influence their decision making differently (Stvilia et al., 2009). Kulkarni and Chi (2013) found that annotations from friends were more persuasive to users in their selection of news articles than were annotations made by people they did not know.

This study builds on prior research in which a model of online consumer health information quality was developed consisting of the constructs of quality criteria, related cues, and heuristics (Stvilia et al., 2009). The current research extends this prior research to mobile wellness applications. In addition to the previous work, a significant body of literature exists on the conceptualization of individual information quality criteria, general frameworks, and context-specific models of information product and service quality (e.g., Parasuraman, Zeithaml, & Berry, 1988), as well as on the use of different heuristics to make indirect quality (i.e., credibility) judgments of websites (e.g., Fogg, 2003) and on software quality (e.g., Fenton, 1991).

Similar to the quality of other products, most of the time, the users of mobile applications may not have access to or the ability to evaluate the source code of an application, and can only assess its quality either directly through the use of the application or indirectly by using cues in the summary description of the application and social cues, including other users' evaluations and quality incident reports (Gallardo-Valencia & Sim, 2011). The summary description of an application may also explicate the intrinsic quality characteristics of the application

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