Use of Mobile Wellness Applications and Perception of Quality

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ABSTRACT
This work-in-progress methodology poster introduces a research project which aims to investigate college students’ use of mobile wellness applications and their perceptions of application quality and usefulness. The poster outlines the overall design of the project and reports on some of the preliminary findings from the first phase of the study. In particular, the poster discusses the findings of the content analysis of 250 consumer reviews on five top-tiered mobile applications for running sampled from Google Play. The analysis showed that the users greatly valued the accuracy of measurements, as well as the reliability and simplicity of the mobile applications.

Keywords
Wellness, health, mobile applications, quality.

PROBLEM STATEMENT
Wellness is generally defined as a lifestyle that involves a preventive approach for the purpose of maintaining good mental and physical health (Myers, Sweeney, & Witmer, 2000). Promoting wellness is essential for improving people’s health and reducing healthcare costs. It has been shown by health communication research that the use of Web health information systems and mobile applications leads to increased knowledge, positive health outcomes, more proactive health behavior (Wantland, Portillo, Holzemer, Slaughter, & McGhee, 2004), and may save resources (e.g., by reducing the number of emergency room visits; Krishna et al., 2003). More research, however, is needed to understand what makes health/wellness applications and information systems useful and usable, and how to promote and increase their use (Mattila et al., 2010).

Mobile applications are rapidly gaining ground not just as channels of tailored health/wellness information distribution, but also as tools used to monitor, log, quantify, and manage the user’s health and wellness activities.

Mobile application stores (e.g., iTunes, GooglePlay) list hundreds of thousands of mobile applications. It is not always clear, however, whether those applications are grounded in high quality medical and kinesiology research and/or perform according to the specifications from their descriptions. At the same time, there is very little research on how consumers search and select mobile applications on the Web. Search engines specializing in mobile application search and retrieval are at startup stages (e.g., Quixey). More research is needed to determine how consumers perceive the usefulness and quality of mobile health/wellness applications, whether the consumer-perceived quality corresponds to the actual quality of the application, and whether the models, constructs and heuristics of quality evaluation identified for Web health/wellness information resources are applicable to mobile applications.

Identifying the structure of consumer decision-making in selecting a wellness application is also essential for search engines, online stores, review portals, and application developers to maintain their ranking algorithms and align them better with the consumer’s perception of usefulness and quality.

RELATED RESEARCH
Our initial conceptualization of the information space that may influence consumer decision-making when selecting a particular wellness application in an application store consists of 5 dimensions or sources: 1) information supplied by the application’s descriptive metadata and social cues, including other user comments and reviews from the application store; 2) information received through social networks such as suggestions from friends and family members; 3) information received from media, including social media; 4) information from health/wellness providers (e.g., physicians, trainers, health centers); 5) information obtained from a search engines. Although there is little research on the use of these information sources in selecting mobile applications, there is prior research on quality, credibility, consumer opinion/sentiment analysis, and the use of these information sources by consumers to make quality judgments for other types of information resources.

Quality is generally defined as “fitness for use”. Quality is contextual and dynamic, and it changes with the changes in
time and space. Ultimately, the problem of quality control and quality assessment for that matter is an ability to connect the change in the quality of a service or product to the change in the activity outcome and the value of that activity outcome change (Stvilia, Gasser, Twidale, & Smith, 2007). Hence, ideally, the quality of a wellness application can be evaluated by assessing the quality of the outcome of an activity(s) the application is used in. When there are multiple alternatives for the same type of service, the quality based selection of an application becomes a search process where the consumer has to identify an optimal application from a multidimensional search space in which the dimensions are quality or usefulness criteria (Lesser et al., 1998).

The quality of information products and services can be evaluated directly through a systematic evaluation and use. Quality can also be predicted by using different heuristics. Researchers have studied the social mechanisms of cognitive authority formation, as well as the use of various system components as cues in heuristic judgments of information product or service quality by consumers (Sundar, Knobloch-Westervick, & Hastall, 2007; Wilson, 1983; Winker et al., 2000; Yi, Stvilia, & Mon, 2012). To evaluate the system’s quality, one has to evaluate not only the quality of a product provided by the system (e.g., a health intervention message), but also the process of its delivery (Parasuraman, Zeithaml, & Berry, 1988). This includes the aspects of consumer’s interaction with the system, such as the speed of loading webpages, its usability (e.g., navigability, readability and personalization), and the cognitive and emotional load/cost of using the information system which can be considered as another kind of cost to the consumer, in addition to the monetary cost of using the website (e.g., a subscription fee; Cyr, Head, & Ivanov, 2006; Ramanadhan & Viswanath, 2006).

The small keypads, displays, and limited processing power of mobile devices pose new usability challenges to the designers of mobile Websites and applications. Venkatesh, Ramesh, and Massey (2003) found that consumer priorities for different aspects of usability for mobile Web were different from the usability priorities for the Web, and Web usability guidelines might not be directly applicable to mobile Web. Furthermore, usability problems can be stemmed from users using mobile devices in motion and hence experiencing a higher physical and cognitive workload than the users of stationary devices (Kjeldskov & Stage, 2004).

Another literature which can inform this study is the software quality literature. ISO (2001) defines software quality as a concept which comprises the following characteristics or criteria: Functional suitability, Reliability, Performance efficiency, Operability, Security, Compatibility, Maintainability, Portability. Most of the times the users of mobile applications may not have access to, or an ability to evaluate the source code of the application, and can only evaluate the above software quality criteria either through the use of the application or indirectly by using quality markers and social metadata such as other user’s evaluations and quality incident reports. Furthermore, the types of quality related incidents and the criticality of quality problems may vary. The literature provides several typologies of software quality incidents and quality problems (e.g., Fenton, 1991).

The preceding studies provide valuable insight into the different aspects and relationships that can potentially affect consumer decision to select a particular wellness application. More research, however, is needed to determine whether these relationships hold for mobile applications; what consumer expectations of and priorities for mobile wellness application quality and quality cues are, and develop an integrated model(s) and knowledge base for the indirect evaluation of mobile wellness applications by consumers.

RESEARCH QUESTIONS
This study addresses the set of research questions below:

1) What sources do students use to find wellness information and services?
2) What kinds of mobile wellness applications do student use?
3) What are the purposes and features of those mobile applications?
4) How do online stores and portals promote mobile wellness applications: What are the metadata elements used by application stores to describe mobile wellness applications?
5) How do students search for mobile wellness applications?
6) How do students search, identify, and select mobile wellness applications in application stores: What the metadata, social cues, and strategies that students use to select a mobile health/wellness application among the alternatives; what is the students’ value structure for those metadata and cues?

PROJECT DESIGN
Our research project attempts to investigate college students’ use of mobile wellness applications and their perceptions of application quality and usefulness. Overall, this project consists of three phases: 1) exploring college students’ wellness-related issues, activities, and perceptions of quality, 2) examining actual uses of cues and heuristics, and 3) determining student value structure for mobile wellness applications (see Figure 1).

![Figure 1. Three phases of the research project.](image-url)
As a part of Phase 1, a literature analysis and a content analysis on 250 consumer reviews were conducted. In particular, consumer reviews were selected from five top-tiered mobile wellness applications for running sampled from Google Play in terms of average ratings. As of June 23, 2013, average ratings on each application were: Runastic Running and Fitness (4.6 out of 5); Endomondo Sports Tracker (4.5 out of 5); MapMyRun GPS (4.5 out of 5); Runkeeper (4.5 out of 5); Nike+ Running (4.3 out of 5).

To explore users’ perceptions of application quality for both positive and negative aspects, ten comments from each rating category were randomly extracted for each application (5 categories × 10 comments × 5 applications = 250 comments extracted). The collected consumer reviews were coded for a) information quality (IQ) and b) software quality (SQ) by using NVivo 10. Table 1 provides a list of the criteria for IQ suggested by Stvilia, Mon, and Yi (2009) and for SQ suggested by Fenton (1991) and the ISO model (2011), which was used as a coding scheme for the content analysis in this study.

### PRELIMINARY FINDINGS

#### Information Quality Criteria

Based on the content analysis, some of the IQ criteria, such as accuracy, cohesiveness, ease of use, and consistency seemed to influence users’ perceived quality of mobile applications for running. In the collected user comments, many users placed a high value on the accuracy of information (e.g., time and millage of their running) in their decision-making regarding whether or not to keep the application on their mobile devices.

“Very good app and very accurate … recommend all runners and walkers download” (c99). “The app is very inaccurate and freezes up a lot. I did a 5-mile run recently and the app measured 6 miles. I don’t recommend this app to anyone.” (c152).

Ease of use and consistency were also frequently mentioned as important criteria for deciding whether or not they will use the application. However, some IQ-related criteria, such as completeness, clarity, and authority were rarely mentioned.

#### Software Quality Criteria

Many users mentioned the compatibility criterion as a beneficial feature for a mobile application for running, as it enables the mobile application to be integrated and used synergistically with wellness-related applications and services.

“Along with the website it's a very comprehensive system. I also have the MyFitnessPal app linked in so you can track calories eaten against calories burned. Top app!” (p46)

Most frequently reported problems were related to unreliable GPS connection, troubles with logging-in and synchronizing user data, as well as lack of multitasking functionality. These were coded as SQ problems, such as device efficiency, accessibility, and consistency.

<table>
<thead>
<tr>
<th>Information quality</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>Accuracy, credibility, reliability</td>
</tr>
<tr>
<td>Completeness</td>
<td>Completeness, clarity</td>
</tr>
<tr>
<td>Authority</td>
<td>Authority</td>
</tr>
<tr>
<td>Usefulness</td>
<td>Ease of use, objectivity, utility</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Accessibility, cohesiveness, consistency, volatility</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Software quality</th>
<th>Criteria</th>
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</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>Accuracy, completeness, consistency</td>
</tr>
<tr>
<td>Usability</td>
<td>Accessibility, communicativeness</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Accessibility, device efficiency</td>
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<tr>
<td>Compatibility</td>
<td>Compatibility</td>
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Table 1. Coding scheme used for content analysis.

“I used to love this app and use it all the time. But with the last few updates, it will not locate me or track distance, which pretty much makes it useless. Stop adding all this social crap that nobody really wants, and concentrate on fixing the basic functions that we got the app for in the first place.” (c3).

In addition, users did not necessarily like the social network-related function, which links user data to social network sites (SNSs), such as Facebook or Twitter. Some users seemed to believe that the additional functions may cause more chances of having bugs, decrease the processing speed, and make the application more complicated.

“Pretty good stand alone features except calls will interrupt your run despite setting not to …. exceptionally frustrating with the social features it is designed to have. Very raw and buggy” (c52).

Considering that the mobile application was mainly intended to support the tracking of running data, secondary (or additional) functions, such as connecting user data to SNSs, did not seem to always have a positive response from users who might perceive these functions as a distraction from the main activity.

### DISCUSSION AND FUTURE RESEARCH

Based on the initial investigation, negative comments, which gave a one- or two-star rating out of five-star rating, tended to talk about malfunction of the software (e.g., GPS signal, synchronizing data, etc.). Inaccurate information was also considered as a critical drawback for the mobile wellness applications for running.

However, users’ perceptions of some IQ criteria (e.g., ease of use, utility, completeness) and SQ criteria (e.g., accessibility, communicativeness) appeared to be rather wide-ranging because both positive and negative comments were observed together. For instance, some users gave a five-star rating for recently added social networking functions, while others gave a one-star rating because they
considered it a distraction. This suggests that even for the same activity (e.g., running) users might have different needs and expectations for application features and quality. These different needs and expectations could be shaped by the objectives of the activity (e.g., competitive vs. recreational running), demographic characteristics, or familiarity with applications, which need to be further examined in the next phases of study. Previous research has shown that supporting selection and easy customization of the functions and features of an application could reduce the complexity of the application as well as enhance user satisfaction (Rosson & Carroll, 2005). In addition, the next phases of the study, which involves a survey and experiment, will examine college students’ value structure of how to choose and utilize mobile wellness applications. Ultimately, findings from the study will contribute to developing an ontology, which can be used as a knowledge base in describing, indexing, ranking, and promoting mobile wellness applications.

REFERENCES


