Using Mobile Technology for Enhancing Young Qatari Health Behavior: An experiment Design

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ABSTRACT
This paper describes the design of an experiment that tests the effectiveness of mobile applications for a weight loss program. The mobile application combines three modules: a tailored text messaging service, a goal setting and progress monitoring support, and a social network setup to achieve the weight management goals. We describe the design of a usability testing experiment for the mobile application before an intervention study is performed with participants.

1. INTRODUCTION
According to the World Health Organization (WHO) fact sheet from March 2011, obesity has more than doubled worldwide since 1980. In fact, there are special challenges the population faces in Qatar. In [5], a discussion of such risks and drivers to overweight in Qatar is provided: there is a fast population and economic growth, extreme weather conditions (it is too hot to exercise outside, especially during the summer) and a fast transition from traditional habits to an industrial society. Research has demonstrated that mobile technology can contribute to fostering a healthy lifestyle. A meta-study by Webb and colleagues [10] found small but statistically significant effects of internet-based interventions on health behavior for 85 studies with more than 43,000 participants in total. SMS and MMS intervention have resulted in significant weight loss over a four month period. Salvy et al. (2007, 2008) described another kind of effective intervention for changing patients’ health behavior that is based on social modeling, social support, and social referencing among peers and strangers. We hypothesize that mobile technology will have the potential to mimic the healthy and encouraging behavior of one’s peers. Our proposal is to develop a culturally and socially appropriate mobile application that leverages the three dimensions discussed in this paragraph: regular contact with health support, setting up achievable, measurable goals, and accessing a virtual social support. We are not aware of similar studies conducted in this region in this context. This paper focuses on describing the mobile application and the strategy that will be adopted for usability testing. It highlights work in progress and will not address the actual experimentation or interpretation of results with participants.

2. RESEARCH HYPOTHESES
A first version of the mobile application was developed by the authors’ faculty supervisor. The overarching hypothesis is that Mobile application can provide enhanced support to traditional methods of weight management. This can further be divided into three hypotheses:

1. A. Regular contact with dietician helps motivate you to sustain weight loss.  
   B. Regular contact with dietician through SMS helps motivate you to sustain weight loss.

2. A. Setting up clear, measurable and achievable goals help you sustain weight loss.  
   B. Setting up clear, measurable and achievable goals through a weight loss application help you sustain weight loss.

3. A. Having access to group social support motivates you to sustain weight loss.  
   B. Having access to virtual social support network motivates you to sustain weight loss.

To test the above hypotheses, we plan to run experiments with an experimental group exposed to the mobile application and a control group that will use traditional weight loss
methods. We expect, based on the literature review, that undergraduates’ health behavior will improve from pre-test to post test for the experimental group that is exposed to the mobile technology. In comparison, we expect significantly less improvement in health behavior for a control group who will get the regular support by a nutritionist, but no additional support via mobile technology. More specifically, we expect provision of tailored health through SMS exchange to support implementation of health behavior compared to control, but not necessarily change of health-related cognition or attitudes in the experimental group compared to control. We expect support with goal setting and monitoring of progress to support awareness, self-efficiency and motivation for improving health behavior in the experimental group compared to control. We expect an implemented virtual social support network to foster motivation, to support learning new options for behavior from social modeling and highest level of implemented health behavior based on social tuning. This effect should hold for the experimental group compared to control and within the experimental group compared to SMS exchange and to goal setting and progress monitoring.

3. METHODOLOGY

3.1 Developing the Mobile Application
We chose to develop the application for Android phones rather than iPhone. Indeed, Android phones are significantly cheaper than iPhones and so are more likely to be used or adopted by users. Moreover, Android applications are written in Java while iPhone applications are based on Objective-C, which matched better with the authors’ programming expertise. An iterative approach to designing and developing a mobile application for the proposed research was adopted. Initial research was done on choosing a medium for dissipating text messages to the participants, and online bulk SMS gateways such as Clickatell were found to be most cost effective while offering the greatest level of customizability. Another option was the bulk SMS system by Qtel (a telecommunication company in Qatar). The final choice will be made when usage gets close as such companies revise their terms and conditions frequently. For evaluating the mobile technology developed in this research, we plan to conduct a study collecting verbal protocols [1] from members of the local community when interacting with the technology. This pre-testing will take place in the IS Lab. We will invite about 5 members of the Education City community to interact with the technology in single participant sessions and to produce verbal protocols while doing so.

3.2 Initial Prototype
To validate the first hypothesis (H1), the participants will use text messaging to interact with a nutritionist (Figure 1.)

To validate the second hypothesis (H2), participants will indicate progress on their personal health goal(s) at the end of each day (Figure 2.)

To validate the third hypothesis (H3), participants will seek virtual social support from peers (Figure 3.)

3.3 Usability Evaluation
To evaluate the mobile technology developed in this research, we plan to conduct a study collecting verbal protocols [1] from members of the local community when interacting with the technology. Five members of the university community...
will be invited to interact with the technology in single participant sessions, and to produce verbal protocols while doing so. Participants will be seated and handed paper copies of the procedure and a consent form. Participants will receive a brief introduction to the SMS exchange service module, the goal setting and progress monitoring module, and the virtual social support network module. They will be asked to perform a couple of trials for each of the three modules, one after the other, for using the technology. While they perform these tasks, participants will be asked to think aloud. The participant will then be given a mobile touch-screen device with the application already launched. A digital audio recorder will be used and will be switched on. Each participant will then be asked to complete a list of tasks to be completed, structured according to the three interfaces we are testing. A participant is free to speak the ease/difficulty of a task, aspects of design that maybe good/bad and so forth. After completion of all tasks, the phone will then be collected and the participant will be handed a paper-based mobile usability questionnaire based on a Mobile Phone Usability Questionnaire [7]. The verbal protocols will be used for identifying potential issues. After each series of trials, participants will be asked to answer a couple of questions on their experience with the application.

4. CONCLUSIONS
This paper described a design of an experiment. The goal is to discover the impact of mobile applications on sustaining weight loss. It presented an early design on the mobile phone interfaces as well as a preliminary usability testing procedure.

5. REFERENCES