A Mobile Application for Improving Health Attitudes: Being Social Matters

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Abstract
This paper describes a pilot test of a mobile phone application, VERA, (Virtual Environments to Raise Awareness) designed to improve attitudes about health by increasing awareness of health behaviors through use of a photolog. VERA was tested in a group and individual setting over the course of 2 weeks. Quantitative and qualitative data were collected. Participants in the group condition rated themselves as more aware of health behaviors and having more self-control after using the system. These results are discussed using a social psychological theory of self-perception and public commitment.

Keywords
Self-awareness, mobile technology, health, photo diary, social technology

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction
Sociological and social psychological work has long recognized the importance of social self-presentation behaviors [7,4]. Self-perception theory argues that attitudes and beliefs are largely determined *post hoc*, as a function of self-observation, or *self-perception* [2]. Related to self-perception theory, public commitment theory argues that having an audience for behaviors tends to magnify the effect that behavior has on

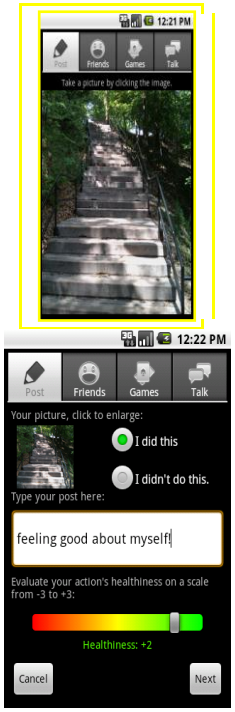

Figure 1. Top: screen shot when taking a picture. Bottom: user indicates participation in behavior ("did/didn't do"), writes an optional comment, and rates its healthiness.

attitudes [13]. This theoretical framework may be useful in understanding the effect that mobile tools that prompt self-observation of health behaviors (e.g. taking a photo of health behaviors) have on related attitudes and beliefs.

Researchers have created and evaluated a wide range of mobile applications aimed at improving health behaviors. These applications have helped young diabetics improve self-efficacy and treatment adherence [6], promote smoking cessation and improve quit rates [12], and motivate adolescents to eat a healthier breakfast [11]. In many cases, group support is a key to changing behavior. Mobile phones in particular can facilitate group interactions, such as support groups, discussion threads, and collective action, which can be used to support health behavior change. As a result, researchers predict that social health systems will encourage and support behavioral change [5].

System Design

VERA is a mobile phone-based system designed to increase awareness of health behaviors at the instant when health related decisions are made. At the time of these decisions (e.g. deciding to take the stairs vs. the elevator, or whether or not to eat a piece of cake), the user opens the VERA app and takes a photo using the phone's built in camera (Figure 1). The system then prompts the user to 1.) identify whether they did or did not do the behavior associated with the photo, 2.) rate the healthiness of the decision with a slider from -3 (most unhealthy) to +3 (most healthy), and then 3.) to optionally leave a short comment on their photo. Once the user has completed the post, they are taken to a screen displaying their recent photos. In the group condition, users can also view others' photos along with info regarding who submitted it, when, and any comment that user left. In the individual condition, participants only saw a history of their own posts. The VERA system was developed on Google's Android 2.x OS using Java and mySQL following an iterative, user-centered design process.

Methods

Twenty-nine participants recruited through Cornell University (students, staff, etc.) were randomly assigned to use VERA in either a group or individual condition. Participants were told that the system was intended to record daily attitudes and behaviors about health using photographs over a two week period.

They were told that the photos should be of things "that are good for you and bad for you and should reflect things you do or don't do." They were then shown how to upload the photo and rate the healthiness of the behavior. All participants were asked to use the system at least five times a day.

All participants were then shown how to review past posts. Participants that were in the group condition were directed to a public page that other people could access in the group condition. People in the individual condition were only shown how to review their own posts. At the study's conclusion, participants completed a quantitative survey and a qualitative interview.

RESULTS

All of the quantitative analyses were performed using *t*-tests (Table 1). Participants in the group condition reported that it was easier to make healthy decisions while using VERA than participants in the individual

	Indiv.	Group
Easier to be Healthy	3.33 (1.45)	4.64 * (1.60)
Found Reviewing Helpful	3.21 (1.71)	4.86 * (2.41)
More Aware	3.73 (1.75)	5.07 † (1.86)
Better Self-Control	3.27 (1.71)	4.36 † (1.65)

Table 1. Comparison of Individual and Group conditions. SD in parentheses. Responses range 1-7. *$p < .05$; † $p < .10$.

condition, $t(27) = -2.32$, $p = .03$. Participants in the group reported that reviewing decisions had a greater effect on health than other participants, $t(26) = -2.08$, $p < .05$. Also, participants in the group reported being more aware of what they ate at a marginally significant level, $t(27) = -2.00$, $p = .06$. Finally, participants in the group condition said that they more often stopped themselves before making an unhealthy decision than participants in the individual condition at a marginally significant difference, $t(27) = -1.90$, $p = .07$.

Interview Questions

In the interviews, participants reported feeling more aware of their health decisions, particularly in the group condition. Many participants noted that using VERA helped them to "think twice" about health choices. As one participant put it, "I felt I was taking pictures of donuts every day so I stopped eating them." The act of documenting and sharing helped users become more aware of their own activities. As another noted, "I realized how much I don't exercise. It's [a] very unhealthy habit I need to change."

However, despite increased health awareness, most participants felt that their health behaviors had not changed drastically. Since the study described here only lasted two weeks, users may not have had a chance for these changes in attitudes to lead to changes in behavior. One participant said, "I feel like VERA made me aware and more conscious of my decisions and got me to pay attention to unhealthy patterns." However, he went on to say, "I have not yet made significant changes to my diet or exercise." Longer-term usage of VERA or similar systems may lead to more significant changes in user behavior, and will need to be further investigated.

DISCUSSIONS

These findings confirm and expand previous work on self-perception and public commitment in digital environments. Digital technology is an efficient means of creating an audience as a means of shifting pro-social attitudes, as observed here and in previous work [13, 9]. If reinforcing positive attitudes about health is a goal of designers and computer scientists, these findings provide additional insight into how to accomplish that goal. These findings may have implications for reinforcing attitude change through the use of other mobile social media; additional work is necessary to further expand the implications of these findings to additional contexts.

This version of the system was designed to enhance awareness and change attitudes about health. In some cases, changes to attitudes are linked to subsequent changes in behavior [1]. Future studies could test biophysical markers of health (e.g. weight, blood pressure) or more measurable health behaviors (e.g. exercise via pedometers) to determine the effectiveness of the system in motivating behavior change. With future success, the system could be tailored to meet the health needs of a particular group, (e.g. diabetes, cancer), or as a means of reinforcing specific health behaviors (e.g. taking medications). Future studies should also examine attitudes and perceptions about sharing health information in such groups. Although our results suggest that the group condition is beneficial, users may be hesitant to share such information. Our future work will examine how privacy is negotiated in such systems.

CONCLUSION

In sum, VERA shows promise for increasing user awareness of health behaviors and encouraging positive attitudes about health behaviors. These findings are consistent with previous research that argues that attitude change is greatest following public behaviors [13]. The role of audience and public behaviors in changing attitudes via digital technology could have important design implications for designers interested in social media. Future research is necessary to better understand how specific features of the technology convey awareness of audience and how those choices influence attitudes.

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