Chick Clique: Persuasive Technology to Motivate Teenage Girls to Exercise

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Abstract
We are developing a preventative health cell phone application that helps motivate teenage girls to exercise by exploiting their social desire to stay connected with their peers. We targeted girls because they are more likely to become less active throughout adolescence and are more likely to use dangerous techniques for losing weight. The intent of Chick Clique is to provide information at opportune times in order to modify the behaviors of girls and ultimately lead to improved health habits. Our study investigated how collecting, sharing and comparing personal fitness information impacts activity level and health awareness.

Keywords
Persuasive Technology, Teenage Obesity, Health Informatics, Preventative Applications

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous. H.5.2. User Interfaces: User-centered design

Introduction
The prevalence of overweight adolescents in the United States has tripled in the past 20 years [5, 10] due to poor dietary habits and a lack of physical activity [12]. The trends for adolescents are of notable concern because overweight adolescents are at an increased risk of becoming overweight or obese adults [8, 10].

Some researchers believe that the current generation of children may not outlive their parents, naming the killer "Sedentary Death Syndrome" [2].

Why teenage girls?

We are targeting girls, ages 12 to 19, because they are more likely to become less active throughout adolescence when compared to their male counterparts [12]. Teenage girls are also more likely to use unhealthy techniques for losing weight such as skipping meals, extreme calorie reduction and purging [10]. Furthermore, girls were found to be more responsive to health behavior interventions in a two-year study targeting adolescent obesity [7].

Current treatment

Behavior modification is the cornerstone of any treatment program. Goal setting, self-monitoring, positive reinforcement and social support have been identified as effective tools in adolescent weight management programs [11]. Our design concept leverages all of these techniques using persuasive technology to change the behaviors of teenage girls.

Persuasive technology

Technology is frequently designed to draw people's attention to specific information in an attempt to change what they do or think. Warning messages and prompts are deployed on the computer screen to guide interaction with software. Advertisers use pop-up ads on web sites in an attempt to lure people into purchasing items. B.J Fogg has labeled this phenomenon "persuasive technology" [6]. Fogg suggests persuasive technology can be used to change people's behaviors in non-commercial domains such as preventative healthcare and fitness [6]. Here, the emphasis is on changing habits or doing something that will improve an individual's well being through monitoring his or her behavior. An example is the FireFly™ toothbrush that has a bright LED light inside that flashes for 60 seconds after pushing on the handle. The flashing light is used to persuade children to brush longer, possibly contributing to improved oral health. Persuasive technology has successfully been employed to design an interactive interface that motivates people to use stairs instead of the escalator at a subway station [9], as well as a ubiquitous computing system that improves hand-washing behavior at the sink [1].

Research goals

Our research is also concerned with how persuasive technology can change behavior, examining how cell phones combined with a pedometer change teenage girls' exercise and eating habits. We describe the iterative design process of a preventative health cell phone application called Chick Clique, a name suggested by teenagers in our participatory design session. Our specific goal is to determine if peer pressure and technology can be combined in a way that increases physical activity in teenage girls. Robert Cialdini describes "social validation" or peer pressure as one that drives human behavior [3]. He describes "liking" or the feeling of being connected as a factor in changing behavior. Chick Clique is intended to act as a persuasive social actor providing positive feedback and leveraging the power of relationships. In our proposed design, when the girls see that their friends are walking a lot they may be inspired. Friends are powerful sales people making it less likely that a girl will reject her friend's request to join her for a walk. A further research question is whether the girls will develop an

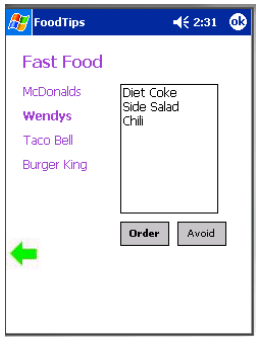

Figure 1. Fast food tips

Figure 2. Step calculator

Level 1: *R U Kidding?*
Level 2: *Slacker*
Level 3: *Keep Workin'*
Level 4: *Work it GRL*
Level 5: *Workout Queen*

Figure 3. Step levels named by teenagers

increased awareness and understanding of the relationship between food, exercise and health.

Design Process

Our user-centered design process began by considering what would be a fun way to motivate teenage girls to exercise more and how to empower them to choose the proper type and amount of food. Persuasive situations are most likely to occur in the context of normal life activities rather than sitting in front of a computer [6]. We began by considering what teenage girls do in their everyday lives and what technologies they own and use. Almost half of the teenagers in the United States own cell phones and enjoy text messaging [13]. We took this as our starting point with a design concept including a cell phone, a pedometer (a device that measures steps), and a very small scale we called a "smart plate." The pedometer would count the steps taken as a measure of physical activity and the smart plate would weigh food at meal times. The cell phone application would be used to record the pedometer readings and the quantity and type of food consumed. Feedback related to personal health goals would then be provided to encourage behavior modification.

Concept formation

We presented our design concept to three registered dietitians during informal interviews. The intent of the smart plate was to facilitate portion awareness but our interview with a pediatric dietitian indicated this idea was not a good choice for our target population stating, "When kids are restricted, they sneak and/or binge later." Girls also have an increase in metabolism associated with growth and their menstrual cycle. If they are restrictive during this time, they may binge later and have negative feelings about themselves.

Realizing the smart plate was potentially hazardous for the targeted user group, we eliminated it from our design. We reworked our idea to one that would safely persuade healthy food choices in teenagers offering a mobile software food tips tool. This tool provides two features: 1) a list of good food choices at various fast food restaurants (Figure 1) and 2) a calculator that quantifies the number of steps required to account for particular "empty calorie" foods, for example candy (Figure 2). Provision of this information fits Fogg's functional view of persuasive technology as a tool that persuades by increasing self-efficacy of the user [6].

We then conducted exploratory field interviews with seven teenagers who reported exercising is the easiest way to improve health when compared with dietary changes. Teens are motivated by exercise that is fun and competitive [4]. In order to incorporate an element of competition we created five step achievement levels and asked the teenage girls to provide their own names that included some slang, as seen in Figure 3. Slang is a badge of identity for teens and private language to share with friends. Allowing each group to create unique names provides a means of personalizing health goals, improving self-efficacy.

After conducting these interviews together with ethnographic study of teenagers at a local shopping mall, where we noted they were constantly talking on their cell phones and text messaging, it became clear that teenage girls are extremely interested in staying connected with their friends. This led us to consider adding a communication element to our design in order to exploit this social desire. Our idea was to use text messaging as a way for the girls to share the number

Figure 4. Group Statistics and step

Figure 5. Group fitness level report

Figure 6. Paper prototype, pedometer disguised in a belt

of steps they took, prompting them to discuss plans for personal or group exercise.

Proposed design

We then designed Chick Clique for a group of up to four friends to engage in a friendly competition where the group's walking statistics are tracked. Each girl enters her "clique" of three people and the pedometer readings are manually entered into the cell phone and stored, keeping track of the number of steps that are taken each day. Automated text messages are sent at opportune times indicating the group performance, including individual fitness level achieved (Figure 4). The step value and associated name (e.g. Slacker) for the fitness levels are established by the user during program setup (Figure 5). Text messages are also sent offering praise for reaching individual step goals. The food tips tool discussed above (Figures 1 & 2) is available from the main menu to use when dining out or curious about how steps taken relate to food intake.

Where will they wear it?

Teenage girls may not enjoy wearing a dull pedometer and functional concerns, such as the pedometer flipping off a waistband and falling into a toilet, present design challenges. We opted for a fashionable pedometer that would be embedded into an article of clothing, jewelry or belt as shown in Figure 6. To show how the system works we next present a scenario of it in use by four teenage girls.

Scenario

Mary, Ashley, Taylor, and Jenny are four teenagers who want to improve their lifestyles. They decide to use Chick Clique as a fun way to get more exercise. They start out slowly, each walking between 1000-3000 steps per day. After a few days, Taylor decides that she would like to increase her exercise and aims for 5000 steps per day. Her accomplishment inspires Mary and Ashley to do the same when they note that Taylor is walking much more than they are. Jenny, on the other hand, takes a few days off. The other girls notice that Jenny is bringing down their group average and encourage her to try harder. They decide that it might be more fun to walk together rather than separately and send each other text messages to plan a 'walking date.' This gives Jenny the extra motivation she needs and the next day she walks 7000 steps.

Prototypes

A paper prototype (Figure 6) was developed to test the usability of the interface. The teenagers we interviewed found the interface easy to use and liked the cell phone concept. However, a few were concerned that competition may lead to excessive exercise. They were highly interested in automating the functionality due to their hectic lifestyles and related forgetfulness.

We moved forward to design and implement a working prototype on a personal digital assistant (PDA) with the critique of preliminary usability test in mind. The software, written in Visual Basic .NET, was developed with consideration for future cell phone implementation in terms of storage limitations and interface design (e.g. size of the display). The prototype includes personal program set up, clique list entry, group and individual progress reports, and food tips tools.

Evaluation

In a pilot study where we used Chick Clique on ourselves for a weekend, we found it was fun to use and made us competitive and walk more. Design

1. Users forget to enter step data
System needs to send reminders

2. Want to see progress over time toward walking goal
Store at least one week vs. one day of step data

3. Food tips tool information is limited
Expand food tips tool to provide more useful information

Figure 7. Pilot findings & design recommendations

Chick Clique is easy to use	4.7
Impact of pedometer alone	3.7
Impact of Chick Clique	3.4
Impact of viewing group statistics	4.0
Importance of food tips	3.9

Figure 8. Response to Post-study questionnaire: Likert Scale 1–5 (not–very)

recommendations based on these findings are presented in Figure 7. We then conducted a user study, using the PDA prototype and pedometers to evaluate the effectiveness and acceptability by teenage girls.

Method

Two separate groups of friends were recruited to participate in the study. One group consisted of four high school students including two 15-year-old girls and two 17-year-old girls. The other group consisted of three middle school students each 13 years of age. Human Subjects Committee approval was obtained and parental consent was secured for each participant. The girls were given a pedometer and the PDA prototype to use for four days. To simulate the automatic text messaging, they established regular times each day to communicate their step counts using text or instant messaging. At the end of the study, all the girls used just the pedometer (by way of comparison) for an additional two day period and reported their steps to us by phone. Pre-study and post-study questionnaires as well as post-study interviews yielded the following quantitative and qualitative results.

Results

The pre-study questionnaire showed that four of the seven participants were active (engaged in routine physical activity), one owned a pedometer, and none owned a PDA. Despite being new to these technologies, the girls rated Chick Clique as very easy to use and the food tips as important (Figure 8). In fact, they were very excited to have the PDAs and showed no fear of the technology while they happily explored the device.

A main finding from the post-study questionnaire was that group performance was rated by the girls as being the most powerful method of changing behavior. Surprisingly, they rated the pedometer alone as being able to increase exercise more than Chick Clique. However, in terms of their actual performance we found a difference between the two groups: the high school girls carried out more steps using Click Clique than with the pedometer (Figure 9) whereas the middle school group took more steps when using the pedometer alone (Figure 10). This suggests that older girls may benefit more from this kind of persuasive technology. The mixed results, however, may be due to the fact that the Middle School girls were on vacation from school while using Chick Clique but had resumed their sport team practices when they used the pedometer alone.

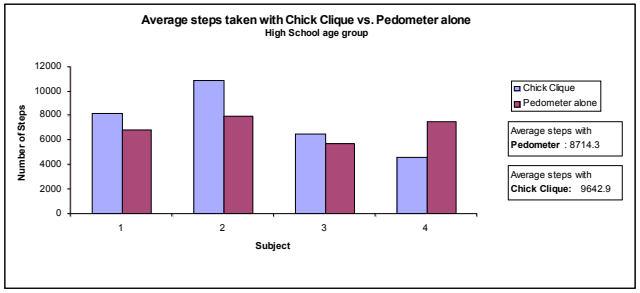

Figure 9. Self reported step data from High School Group

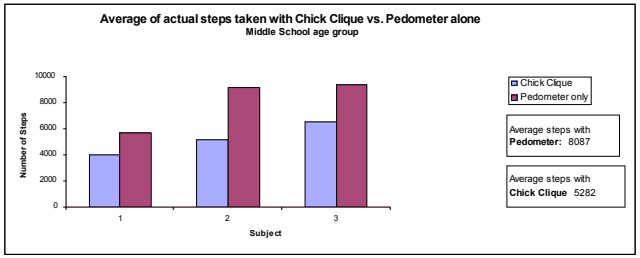

Figure 10. Self reported step data from Middle School Group

Chick Clique was also effective in terms of raising the awareness of the relationship of food, exercise and health. One participant stated that "[Chick Clique] makes me think more about what I eat and how much exercise I get. It helps you feel on top of your fitness and health goals." The girls also showed enthusiasm toward the food tips tools. The increased awareness of health issues went beyond the use of Chick Clique. Many of the girls stated they messaged one another discussing health related issues and tips, something they wouldn't ordinarily do. One of the participants said that using Chick Clique "brought us all together more. We could talk about being healthy and our issues with being healthy, because no one [normally] wants to talk about that and [we were] more comfortable."

Our future plans are to develop a full implementation of Chick Clique on a cell phone. We will conduct a longer study with more user groups to determine if there is an age effect with this kind of persuasive technology.

Conclusion

Chick Clique, a mobile preventative health application offers a way to reach out to young women who enjoy technology and need motivation to continue being physically active throughout adolescence. In sum, Chick Clique changes the isolated process of self-monitoring into a cooperative, supportive process where friends can share personal fitness information and give one another encouraging feedback.

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