nobile: Design and evaluation of a persuasive technology application for social behavior change

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nobile: Design and evaluation of a persuasive technology application for social behavior change

by

Batzaya Batsaikhan

A thesis submitted to the graduate faculty in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Major: Human Computer Interaction

Program of Study Committee:
Ana-Paula Correia, Major Professor
Stephen Gilbert
Debra Satterfield

Iowa State University
Ames, Iowa
2014

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II

DEDICATION

I dedicate this thesis to my beloved mother and grandparents.
# TABLE OF CONTENTS

LIST OF FIGURES v

LIST OF TABLES viii

ACKNOWLEDGEMENTS ix

ABSTRACT x

CHAPTER 1. INTRODUCTION 1
  1.1. The Problem 1
  1.2. The Research Questions 3
  1.3. The Motivation Behind This Study 5
  1.4. Thesis Organization 9

CHAPTER 2. REVIEW OF RELEVANT LITERATURE 10
  2.1. The Next Frontier: Reclaiming Conversation 10
  2.2. The Quantified Self 14
  2.3. Social Impact Theory 20
  2.4. Persuasive Technology and The Fogg Behavior Model 23
  2.5. Current Research & Development Efforts and Applications 32
  2.6. Summary 41

CHAPTER 3. DESIGN AND DEVELOPMENT 43
  3.1. Ideation, Concept and Prototyping 43
  3.2. Interface Design 52
  3.3. Development 58

CHAPTER 4. METHODOLOGY 63
  4.1. Study Participants 63
  4.2. Methods 64
  4.3. Procedures 68
  4.4. Predictions 72
LIST OF FIGURES

Figure 1.1. Displacement of People 7

Figure 2.1. The Fogg Behavior Model 25

Figure 2.2. Eight Steps in Early-Stage Persuasive Design 29

Figure 2.3. Surcharging the Bill 36

Figure 2.4. The UNICEF Tap Project 37

Figure 2.5. Beer Mode Interface 39

Figure 2.6. Lively Interface 40

Figure 3.1. The Fogg Behavior Model in nobile 46

Figure 3.2. Early-Stage Persuasive Design Principles adapted to nobile 47

Figure 3.3. The Information Architecture of nobile 49

Figure 3.4. Home Screen (wireframe) 50

Figure 3.5. Profile (wireframe) 50

Figure 3.6. Challenge (wireframe) 50

Figure 3.7. Home Screen (low fidelity) 51

Figure 3.8. Profile (low fidelity) 51

Figure 3.9. Challenge (low fidelity) 51
Figure 3.10. Home Screen (high fidelity)  51
Figure 3.11. Profile (high fidelity)  51
Figure 3.12. Challenge (high fidelity)  51
Figure 3.13. Color, Icons, and Typeface  53
Figure 3.14. Launch Screen  54
Figure 3.15. Sign Up  54
Figure 3.16. Sign In  54
Figure 3.17. Home Screen  54
Figure 3.18. Central Menu  54
Figure 3.19. Friend Requests  54
Figure 3.20. Find Friends  55
Figure 3.21. Profile  55
Figure 3.22. Edit Profile  55
Figure 3.23. Edit Password  55
Figure 3.24. Check-In  55
Figure 3.25. Invite Friends  55
Figure 3.26. Pop-Up  56
Figure 3.27. Results (Win)  56
Figure 3.28. Results (Lose)  56
<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.29</td>
<td>Prompt</td>
<td>56</td>
</tr>
<tr>
<td>3.30</td>
<td>Challenge (Lose)</td>
<td>56</td>
</tr>
<tr>
<td>3.31</td>
<td>Challenge (Win)</td>
<td>56</td>
</tr>
<tr>
<td>5.1</td>
<td>Native Language Demographics</td>
<td>75</td>
</tr>
<tr>
<td>5.2</td>
<td>Smartphone Types Used among Participants</td>
<td>76</td>
</tr>
<tr>
<td>5.3</td>
<td>Social Network Usage among Participants</td>
<td>79</td>
</tr>
<tr>
<td>5.4</td>
<td>Time Spent on Social Networks on an Average Day</td>
<td>79</td>
</tr>
<tr>
<td>5.5</td>
<td>Number of Friends/Followers on Social Networks</td>
<td>80</td>
</tr>
<tr>
<td>5.6</td>
<td>Smartphone Activities</td>
<td>81</td>
</tr>
<tr>
<td>5.7</td>
<td>Smartphone Usage during Social Situations</td>
<td>82</td>
</tr>
<tr>
<td>5.8</td>
<td>Smartphone Usage during Meals</td>
<td>83</td>
</tr>
<tr>
<td>5.9</td>
<td>Places where Participants Usually Meet</td>
<td>85</td>
</tr>
<tr>
<td>5.10</td>
<td>Important Factors when Choosing a Venue</td>
<td>85</td>
</tr>
<tr>
<td>5.11</td>
<td>Venues where participants would like to receive discounts</td>
<td>86</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 2.1. The Quantified Self Tracking Categories and Variables 15
Table 2.2. Current R&D Efforts and Applications 32
Table 4.1. Usability Tasks 70
Table 5.1. Age Demographics 75
Table 5.2. Gender Demographics 75
Table 5.3. Education Demographics 75
Table 5.4. Smartphone Usage on an Average Day 78
Table 5.5. Smartphone Activities 80
Table 5.6. Smartphone Usage in Various Situations 81
Table 5.7. Do You Feel uncomfortable without Smartphone? 83
Table 5.8. How Often Do You Go Out with Your Friends, Family or Peers? 84
Table 5.9. Overview of Task Completion 87
Table 5.10. System Usability Scale Results 97
Table 5.11. System Usability Scale Results #2 98
Table 5.12. System Usability Scale Results #3 98
Table 6.1. Major Usability Issues 108
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Modern society is becoming increasingly connected and more and more technology-enabled. Communication technology is as portable as ever, thus rapidly proliferating, and not surprisingly, many carry at least one or more communication technologies, such as smartphones and tablets, with them on a daily basis, giving the means of constant connection. As a result, this constant connectivity has been discreetly disrupting not only how communication occurs between people but also lives. People come together but barely speak to each other. Rather, they rely on technology, for instance, smartphones, for companionship, and this may have negative consequences on one’s social life and interpersonal relationships.

This research study presents a persuasive technology application for social behavior change called nobile, no+mobile, that encourages people to have face-to-face interactions and reduce their excessive use of smartphones by challenging users to not use them. The application prototype was iteratively designed, developed for Android, and evaluated. In order to evaluate whether people were persuaded to put smartphones down and converse face-to-face with each other, and to assess the usability of the application, 15 participants between the age of 18 and 29 were recruited, then asked to do a series of tasks including a simulated no+mobile challenge, and their interaction with the application interface was recorded, and
spontaneous behaviors were observed. Furthermore, participants completed questionnaires before and right after the study, and they were briefly interviewed regarding their experience with the application. Initial study results have shown that *nobile* is effective at incentivizing non-usage of smartphones, as well as encouraging face-to-face interactions, and it can be used as a platform for conducting research studies regarding social interactions, thus marketable. Future directions are also presented.
CHAPTER 1. INTRODUCTION

1.1. The Problem

Nowadays, people around the world are just a tap away from each other. Thanks to communication technology like smartphones and online media, distance is not a barrier anymore to being connected. According to Forbes Magazine (2012), there are over five billion mobile phone users in the world, and one billion is smartphone users with a global growth of 42% every year (Olson, 2012). The world is going mobile. The common goal of the mobile phone users is to be in touch with their loved ones everywhere they go, but “technology is seductive when what it offers meets human vulnerabilities” (Turkle, 2011, p. 1).

Thus, how people communicate, or rather, live is being shaped by technology. Brad Shimmin (2014), a social media analyst at an industry research firm Current Analysis observed people, “They are more electronically engaged than with each other,” and said that smartphones “are keeping us more connected than we were before, and they’re keeping us more apart than ever before.” (cited by Levine, 2014, para. 9) Streets seem empty even when full of people. Pedestrians roam staring at their phones on the sidewalk giving a “glazed expression” (Olson, 2012, para. 1) unconscious of the surroundings and others. Friends sit together like strangers, immersed into their smartphones instead of conversing. Glow of flashing screens in
theaters, cinemas, and birthday parties disrupting the lively moment. It is safe to say that these spectacles are ubiquitous throughout the modern society.

Recently, society and people are beginning to acknowledge these happenings mentioned above, and how they are being changed as technology offers them substitutes for connecting with each other face-to-face (Turkle, 2011). There have been attempts to solve this newly discovered obstacle for human social behavior. During social gatherings, people started playing games like The Phone Stack by stacking their phones on the table, and whoever touches the phone first gets the bill, yet the origin of this game is unclear. Presumably, the game has simply born out of social necessity, thus many claims to have invented it.

In a village outside of Jerusalem, a restaurant owner says that he is striving to save the etiquette of dining by making 50% discount offer to customers if they turn their cellphone off. (Heller, 2013). Thousands of miles away, in Los Angeles, California, diners of Eva Restaurant on Beverly Boulevard receive 5 percent discount if they leave their cellphones at the front desk (Hudson, 2013). Award winning director Spike Jonze raises the issue of connected loneliness of the modern society on his 2013 film Her. It follows the story of a lonely, but soulful man who ultimately falls in love with his intelligent operating system installed on his handheld device. Later on the film shows that he was not the only one. Director Henry Alex Rubin’s 2012 thriller film Disconnect also explores the devastating effects of communication
technology on human relationships, specifically families. As importantly, UNICEF recently launched a campaign called “The UNICEF Tap Project.” It is a web-based tool that prompts people to put their smartphone down and ignore it (http://tap.unicefusa.org/). For every 10 minutes one spends ignoring the phone, a sponsor of UNICEF donates funding for one day's worth of clean water to children in need. (Sorokanich, 2014).

People are “increasingly connected to each other but oddly more alone” (Turkle, 2011, p. 19), and they are aware of it. Social behavior is in the midst of change. Meaningful interpersonal communications are missed. Reviving face-to-face interaction has become a challenge for the modern society. This research study addresses the design, development, and evaluation of an application built to encourage face-to-face interaction, less use of smartphones, in favor of spending more quality time with friends, family, and peers.

1.2. The Research Questions

Although the modern society is beginning to acknowledge that ubiquity of smartphones is changing, or rather disrupting, the norms of communication, there has not been any major effort to develop an application that is specifically designed to encourage people to take a break from their smartphones and have a real conversation. “It’s like when a great invention comes along,” Shimmin said, “and it
makes our lives a little worse until a better expression of that technology comes along.” (cited by Levine, 2014, para. 13) This research study proposes a potential “better expression”, and describes the background, design, development, and evaluative findings of a persuasive smartphone application called nobile for iOS and Android. nobile was created by this thesis author and developed for this research study. This application enables users to have face-to-face interaction and reduce excessive use of smartphones by challenging each other to not use smartphones during social gatherings for discounts prizes while suggesting enthralling questions for starting conversations. It is expected that nobile use will positively impact users’ social behavior, and nobile can be used as platform for conducting research studies concerning social interactions. Target users of nobile can be identified as young in age, between 18 to 29, tech-savvy, and innovators or early adopters (Rogers, 2005) in nature.

The research questions that guide this research study are as follows,

**Research Question 1:** Do users excessively utilize smartphones?

**Research Question 2:** Does the nobile user interface provide an effortless experience?

**Research Question 3:** Does nobile incentivize non-usage of smartphones in social situations?

**Research Question 4:** Do users feel persuaded to change their social behavior and converse with the aid of nobile?
**Research Question 5:** Can *nobile* be used as a platform for conducting research studies with respect to social interactions?

It is rather clear that the market is brimful of applications of various types that make it hard to put smartphones down. Given what is happening around the world, and since “people are social creatures who rely on the company of others” (Bugeja, 2005, p. 46), an application that advocates positive behavior change, and encourages smartphone users to take a break from the smartphones for meaningful conversations during social gatherings can make widespread beneficial impact on the modern society.

### 1.3. The Motivation Behind This Study

This particular research was initially and primarily inspired by author’s observations of real life situations. It was further supported by a review of relevant literature and academic research, and strengthened by a research study that is the core of this thesis. The major motivations behind this research effort can be divided up into four different components.

#### 1.3.1. Distracted Driving

Distracted driving is essentially navigating a vehicle while the attention is being diverted by another activity. It can potentially increase the chance vehicle
crashes and fatal accidents, many agree that texting or talking on the phone has become one of the biggest distraction factors. According to Centers for Disease Control and Prevention in 2011, 3,331 people were killed in crashes that involve distracted driving, and 387,000 were injured. Sixty-nine percent of drivers in the United States between the age of 18 and 64 reported that they had talked on their phone, and 31% had read or sent text messages or emails while driving ("Distracted driving," 2013). There have been numerous academic studies related to distracted driving, such as “Trends in fatalities from distracted driving in the United States, 1999 to 2008” (Wilson & Stimpson, 2010), and some states in the U.S have banned the use of handheld devices when driving.

1.3.2. Displacement and Distraction

Social activist Parker J. Palmer believes the most public place is the street, because people meet strangers with whom they interact, even when nobody speaks. People send a message through the channel of their bodies in real place (Palmer, 1981; as cited in Bugeja, 2005). As discussed earlier, nowadays, the streets are full of people gazing at the tiny glowing screens giving and sending the expression of displacement. Physically present but elsewhere. The norms of social behaviors are being shaped. Deceived by the illusion of digital companionship without the demands of friendship, people get distracted and deny their full attention (Turkle,
Clearly, there is absolutely no interaction when one is immersed in the smartphone (see Figure 1.1).

The phenomenon and behavior can be observed not only in the streets, but also cafes, buses, subways, malls, restaurants, even during live concerts. When people do socialize, “rare and precious moments of face-to-face interaction and conversation are routinely interrupted by social network notifications, emails, incoming calls, and text messages” (Turkle, 2011, p. 161). It’s already hard to socialize without someone having to reply to a text or a notification. Besides the disrupted personal relationships, overtime these interruptions can cause Phantom Vibration Syndrome which will be discussed further below.
1.3.3. Health

Excessive use of smartphones spawned numerous health issues including short sightedness, severe, neck and back pain, phantom vibration syndrome, and others. David Allamby (2013), founder of Focus Clinics, reports since 1997 the number of people with myopia, in other words short or near sightedness, has increased by 35%. He believes the problem could increase by 50% in the next ten years, and dubs it *screen sightedness* (Innes, 2013) and a global epidemic.

In addition, “forward head posture, or ‘Text Neck,’ can cause nerve pain or lead to metabolic problems” (Wilson, 2012, para. 1). Informal slangs such as “You’re a pain in the neck” are being used among people. Dean Fishman, a chiropractor who practices at the Text Neck Institute in Fort Lauderdale first coined the term ”Text Neck” in 2008 as the diagnosis for nerve pains around the upper torso and a forward head posture caused by excessive use of handheld devices. Also over time, “it can even flatten or reverse the natural curve of the neck” (Wilson, 2012, para. 5).

According to *The Text Neck Institute* it is a “global epidemic” ("The text neck", 2013) like *screen sightedness*, and taking frequent breaks from handheld devices and maintaining good posture can prevent this.
1.3.4. Phantom Vibration Syndrome

Routinely checking the phone is not only a learned habit, but a syndrome. Phantom ringing or phantom vibration syndrome is a recent psychological phenomenon where one perceives vibrations or rings when the device is not doing so. Recent study shows that approximately 90% of undergraduate students from various colleges in the U.S admit they felt phantom vibrations. However, few found it bothersome. (Drouin, Kaiser & Miller, 2012)

1.4. Thesis Organization

This thesis is divided into six chapters. Chapter 1 includes a general introduction to the research study. Chapter 2 contains a review of literature regarding personal communication in the digital age, the movement of The Quantified Self, Social Impact Theory, Persuasive Technology Design and Behavior Models, other relevant studies, and current tools and applications that align with the purpose of the study. Chapter 3 describes the design and development process of the application, nobile. Chapter 4 explains the methodology used in this research study, including data collection and data analysis methods. Chapter 5 presents the findings of the study. Chapter 6 comprises of conclusions, and future research and development directions. The final two sections include references and appendices.
CHAPTER 2. REVIEW OF RELEVANT LITERATURE

This chapter explores research findings and literature relevant to the research questions at hand. It begins by explaining why reclaiming conversation through exploration of personal communication is the next frontier in the digital age, continues on to the movement of The Quantified Self (Swan, 2013) with nobile falling within its boundaries, then delves into the theory of Social Impact, Persuasive Technology Design, and Behavior Models. It concludes with an analysis of current tools in the market comparable to nobile and efforts in society to reduce the excessive use of smartphones.

2.1. The Next Frontier: Reclaiming Conversation

“When someone says, ‘I’m going online’, where are they going?” questions Wood & Smith (2001), the authors of Online Communication: Linking Technology, Identity & Culture. In today’s context, the question can be rephrased to “When someone is on the smartphone, where are they?” There clearly is no simple answer to this question. Nowadays, there are countless different ways to be in touch with others, with online media being the most popular form of communication, enabling people to be connected to large groups with essentially just a finger tap. The most phenomenal change that came with these increasingly mobile technologies, e.g.,
smartphones and online media with instantaneous connection, is the possibility to simultaneously be both physically present yet elsewhere (Baym, 2010). This phenomena is generally considered as the major intrusion of technology into interpersonal communications and also the basic premise of this research study. As Baym (2010) explains, “consider, for instance, the dinner partner who is immersed in his mobile phone conversation. Since he is physically present in one space, yet mentally and emotionally engaged elsewhere, the very nature of self becomes problematic,” (p. 3). She calls it “placelessness” and explains that it creates the illusion of being together with others when in reality they are apart (Baym, 2010).

People, specifically the generation introduced to smartphones at a young age and the generation now growing up with ubiquitous technology, seem to be immersed in smartphones. According to the Pew Research Center, 98% of persons between the age of 18 and 29 own a cell phone and 83% of them have smartphones. Among young people (18 to 29 years old) 92% use the Internet (Baym, 2010). Sixty-seven percent of mobile-device owners report that they find themselves regularly checking their phone for messages, notifications, or calls, even when their phone is neither ringing nor vibrating (“Mobile Technology Fact”, 2014). Drouin, Kaiser & Miller (2012) commissioned a study concerning “Phantom Vibration Syndrome” among undergraduate students of various colleges and found out that 89% of the participants had experienced phantom vibrations, and that the average repetition of
the phantom vibration was once every two weeks. Interestingly, only few found these phantom vibrations to be bothersome and therefore made attempts to stop them (Drouin, Kaiser & Miller, 2012). These findings are very intriguing since it indicates that the majority of young adults have already become used to phantom vibrations or rings and consider them to be normal occurrences. Park & Lee (2011) write, “This compulsive usage of smartphones may have negative effects on social life and human relationships” (p. 2). Studies (Park & Lee, 2011) show that people find entertainment and stress relief when they use smartphones, but an unexpected side effect is that people engaged on smartphones tend not to interact or converse with others face-to-face.

Intriguingly, excessive smartphone usage is not necessarily categorized as an addiction. Excessive Internet or smartphone usage and addiction have some similarities, but “excessive use does not result in all the symptoms and behaviors associated with a chemical addiction, such as physical withdrawal,” (Beard & Wolf, 2001, p. 378). Thus it can be seen that, without any established social norm for technology use, the ubiquity of mobile technology is essentially blurring “the boundary between mass and interpersonal communication in ways that disrupt both.” (Baym, 2010, p. 4)

As discussed in the previous chapter, society has already started acknowledging this issue. Social games, smartphone applications, and films such as
Her and Disconnect have raised awareness concerning possible negative outcomes of excessive smartphone usage. Mindy Weiss, a party planner in New York and Los Angeles who specializes in celebrity events, said banning cellphones is becoming a new normal requirement “on the high-profile end.”(Tell, 2013)

In her book “Alone Together” Sherry Turkle (2011) stated “If the problem is that too much technology has made us busy and anxious, the solution will be another technology that will organize, amuse, and relax us,” (p. 11). She also writes that what people want most is control of where they put their attention, and that explains why many people choose technology over face-to-face interaction.

Technology offers control; people do not, but developing face-to-face interaction and conversational skills is crucial. During her 2011 TED and TEDxUIUC talk concerning how technology is disrupting face-to-face communication among people, Turkle famously stated “Reclaiming Conversation. That’s the next frontier,” (Turkle, 2011) and this research study is directed toward developing an application for that particular purpose. The primary focus of this thesis is the positive impact such an application can have on society and people in general by reviving face-to-face interaction and meaningful interpersonal conversation.
2.2. The Quantified Self

*nobile* is partially a Quantified Self application. According to a Pew Research Center report, as of January 2014, 90% of American adults have cell phones and 58% have smartphones (“Mobile technology fact,” 2014) and these percentages are increasing. Ubiquity of portable mobile technologies has enabled cheaper and more convenient personal data-acquisition methods, including possible mechanisms for automatically obtaining unusual qualitative and quantitative biometrics such as sleep pattern, blood pressure, etc. This has led to “The Quantified Self,” a movement to incorporate technology into data acquisition directed toward aspects of a person’s daily life. It is generally agreed that in 2007 Wired Magazine editors Gary Wolf and Kevin Kelly first proposed the term The Quantified Self to describe “a collaboration of users and tool makers who share an interest in self-knowledge through self-tracking,” (Kelly & Wolf, 2007; ”Quantified self,” 2013, para. 2).

The term The Quantified Self is rather new even though the concept itself is not. One of the mentionable early records of The Quantified Self describes how Benjamin Franklin tracked 13 personal virtues in his life in order to perfect his morality. (Moschel, 2013). Swan (2013) writes, “In some sense, everyone is already a self-tracker since many individuals measure something about themselves or have things measured about themselves regularly,” (p. 85). This includes, for example, regular doctor checkups, keeping a diary, journals and calendars, monitoring food
intake, and making a to-do list on paper, all forms of self-tracking. According to a Pew Research Center (2013) report, 49% of U.S adults maintain records of their health progress in their heads while 34% do this using notebooks or journals (Fox, 2013).

Table 2.1. The Quantified Self Tracking Categories and Variables (Augemberg, 2012)

<table>
<thead>
<tr>
<th>Tracking Categories</th>
<th>Variables</th>
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<tbody>
<tr>
<td>Physical Activities</td>
<td>miles, steps, calories, repetitions, sets, METs (metabolic equivalents)</td>
</tr>
<tr>
<td>Diet</td>
<td>calories consumed, carbs, fat, protein, specific ingredients, glycemic index, satiety, portions, supplement doses, tastiness, cost, location</td>
</tr>
<tr>
<td>Psychological States and Traits</td>
<td>mood, happiness, irritation, emotions, anxiety, self-esteem, depression, confidence</td>
</tr>
<tr>
<td>Mental and Cognitive States, and Traits</td>
<td>IQ, alterness, focus, selective/sustained/divided attention, reaction, memory, verbal fluency, patience, creativity, reasoning, psychomotor vigilance</td>
</tr>
<tr>
<td>Environmental Variables</td>
<td>location, architecture, weather, noise, pollution, clutter, light, season</td>
</tr>
<tr>
<td>Situational Variables</td>
<td>context, situation, gratification of situation, time of day, day of week</td>
</tr>
<tr>
<td>Social Variables</td>
<td>influence, trust, charisma, karma, current role/status in the group or social network</td>
</tr>
</tbody>
</table>

Accordingly, another definition, one proposed by Melanie Swan (2013), describes this concept with greater clarity, The Quantified Self is “any individual engaged in the self-tracking of any kind of biological, physical, behavioral, or environmental information. There is a proactive stance toward obtaining
information and acting on it. A variety of areas may be tracked and analyzed, e.g., weight, energy level, mood, time usage, sleep quality, health, cognitive performance, athletics, and learning strategies,” (Swan, 2013, p. 85). Table 2.1 shows the self-tracking categories and variables of The Quantified Self.

It appears that the “Quantified Self” is becoming an important concept with respect to self-tracking devices and applications. Modern, technologically-advanced and wearable tracking devices are mainly directed towards health, diet, and well-being. Widely-used examples include FitBit pedometers, Nike+ Fuelband, and Jawbone UP, along with a vast number of smartphone applications designed to measure personal mood, productivity, exercise, posture, and other variables. Studies (Fox, 2013) show that 60% of U.S. adults report that they track their weight, diet, or exercise routine, and 33% track health symptoms like blood pressure, headaches, or sleep patterns.

There are 505 tools and applications listed on the “Quantified Self” website (http://quantifiedself.com/guide/) as of April 2014, and most “Quantified Self” solutions pair such devices with a web and mobile interface to aggregate data, recommendations, and goals (Swan, 2013). Given non-stop technological advancement, with computing power doubling approximately every two years (Moore, 1965; Schaller, 1997), the above numbers and percentages are most likely to increase in the future.
The main reason people use The Quantified Self products is to resolve a specific lifestyle issue, e.g., sleep quality, and “self-tracking actually benefits one’s overall health and wellness as well as the psychological empowerment and responsibility-taking” (Swan, 2013, p. 87). Furthermore, studies (Fox, 2013) show that 46% of The Quantified Self product users report that self-tracking has helped them change their overall approach to maintaining their health and wellness. Based on these findings, an assumption can be made that if face-to-face interaction is becoming a specific lifestyle issue, then creating a self-tracking application, nobile, may solve this particular issue.

For this research study, the issue is a lack of interaction and meaningful interpersonal relationships and conversations resulting mainly from the excessive use of smartphones, and the proposed solution is that users measure their smartphone-free time both collaboratively and competitively, with a goal of achieving positive impact on their behavior and thereby increasing face-to-face interaction. This assumption is supported by Swan’s claim (2013) “that while the concept of the quantified self may have begun in n=1 self-tracking at the individual level, the term quickly being extended to include other perambulations like ‘group data’ — the idea of aggregated data from multiple quantified selves as self-trackers share and work collaboratively with their data,” (p. 86). Furthermore, since there may be little purpose to self-tracking if there is no feedback loop connecting the
result back to real-life problem solving and behavioral change, the next generation “Quantified Self” will be focused on tracking “qualitative phenomena” such as mood, emotion, and behaviors, based on quantitative data. (Swan, 2013)

Recently, Jordan & Pfarr (2014) have proposed the concept of “The Quantified Us,” almost exactly the same as Swan’s, explaining that the new concept should be based on “a select group of people who share similar goals, health conditions, or even similarity of emerging data patterns,” (para. 5), and suggesting that The Quantified Self movement should address “a second-degree meaning” going beyond data acquisition and analysis of one’s current health or psychological state toward people collaboratively reinforcing each other in terms of self-improvement (Jordan & Pfarr, 2014). These findings show that self-tracking is often used for subjective or qualitative purposes and has had immense impact on the implications of nobile because that application addresses the social variables of The Quantified Self (see Table 2.1) and is designed to persuade users to reduce the use of smartphones collaboratively to achieve positive behavioral change.

The biggest limitation of The Quantified Self is privacy, because many see automatic data acquisition as discourteous privacy intrusion. This is a very tangible concern. With the ubiquity of wearable devices, smartphones, and other technology-based devices, unusual qualitative and quantitative biometrics such as sleep pattern, blood pressure, and other personal information including location, shopping
habits, and others, may be easily obtained, shared, and used. For instance, the “Privacy” statement of the Jawbone UP wearable tracking device mentioned earlier reads ("Jawbone privacy," 2013, para. 12),

We may share your personal information with your consent.

We may share your Information with third parties to provide services on our behalf such as to process payments, or to store information collected through our site, app, and services.

We may share information with a parent company, subsidiaries, joint ventures, or other companies under common control with us.

Data is the currency of power in this digital age; it is thus rather clear that companies’ business models are shifting to ones that built upon data acquisition and aggregation, and just as this trend has the power to make people’s lives better, in the wrong hands it can also harm people.

Entrepreneurial efforts and purposeful human-computer interaction interfaces are likely to play important roles in further progression and development of The Quantified Self movement. Although there are a few drawbacks in The Quantified Self movement, e.g., privacy, as discussed earlier, given the various circumstances of what is happening in society as well as the ubiquity of technology, it is likely that effective The Quantified Self incorporations that address sensitive
concerns like privacy will be leading people to self-reflection, self-motivation, and positive behavioral change.

### 2.3. Social Impact Theory

Individuals are different and therefore influence one another if close in proximity, possibly resulting in behavioral changes (Hogg & Tindale, 2008). This is one of the main premises of nobile, since it is a persuasive technology application that encourages users to collaboratively change their social behavior. The term “social impact theory” was first coined by the Ohio State University psychologist Bibb Latane in 1981 and further developed by Latane, et al., in 1996. This theory specifies the effects and influences of others on an individual. According to Latane (1981), social impact is “any of the great variety of changes in physiological states and subjective feelings, motives and emotions, cognitions and beliefs, values and behavior, any socially influenceable attributes that occur in an individual, human or animal, as a result of the real, implied, or imagined presence or actions of other individuals,” (p. 343).

Latane’s (1981) model of social impact comprises the following three factors:

**Strength:** Importance, power, or intensity of the influencing group to the target.

**Immediacy:** Proximity of the influencing group to the target, and presence or absence of intervening factors.
**Number:** Number of individuals in the influencing group.

Based on these three factors, social impact theory is embodied in three basic principles. They are:

**Principle 1.** “The amount of impact experienced by the target is the result of multiplicative function of the strength of the source impact, the immediacy of the event, and the number of sources present,” (Latane, 1981, p. 344)

**Principle 2.** The Psychosocial Law says that the “amount of impact will increase in proportion to some root of the number of people present.” (Latane, 1981, p. 344) However, there is a substantial difference between having zero sources and having one source, and the first influencer will have a greater impact than the hundredth.

**Principle 3.** When the number of targets increases, each individual target experiences reduced impact.

This theory is quite general, yet specific enough that its application can be observed in a variety of contexts, e.g., social media. Social media encompasses Latane’s (1981) model by allowing people to connect both synchronously or asynchronously with influence groups such as friends, family, and colleagues (strength), (immediacy), and the number of connections can be arbitrary. Successful implementation of social impact theory might have played an important role in the breakthrough of social media.
According to Business Insider (2014), social media is now the top Internet activity. On an average day, each person in the United States spends approximately 37 minutes on social media, a number higher than any other Internet-related activity, including email, (Adler, 2014), and, as of May 2013, “63% of U.S cell owners use their phones to go online” (“Mobile technology fact,” 2014, para. 9). It appears that social media and other solutions based on social media, like quantified self applications that measure personal attributes and allow users to share measurements on social media for others to see and respond to, are becoming powerful tools for interpersonal communication as well as providing social impact and influential tools of modern society.

2.2.1. Dynamic Social Impact Theory

Subsequent development, or more suitably an extension of the original 1981 model, has lead to dynamic social impact theory comprised of three further assumptions. “First, individual human beings, varying in strength and other attributes, are distributed in social space. Second, each person is influenced by his or her own individual experience, or bias, and by other people in proportion to a multiplicative function of their strength, immediacy, and number. Third, a person will change a given attribute if and only if total persuasive impact (the pressure to change to a different position) plus supportive impact (the pressure to maintain
one’s present position)” outweighs bias (Hogg & Tindale, 2008, p. 239). The third assumption indicates why collaborative tools show better results than self-reflective ones. It appears that the most effective way to change a certain behavior is to do it socially with the support of others, and in the *nobile* context collaboratively influencing each other’s behavior.

Centola (2013) claims “that social influences are a primary factor in the adoption of health behaviors”, and “routines can depend on having contact with friends and family who also engage in these behaviors,” (p. 2135). It is rather clear that this claim can be applied not only to health behavior but to every human behavior, and specifically to social behavior. This research study is related to the theory of social impact because its primary objective depends on the positive and beneficial impact it has on human social behaviors, and specifically the way people communicate with one another. Moreover, the proposed *nobile* application is social and collaborative in nature, and involves two or more individuals present at a given time and reciprocally influencing one another to some degree in order to change the behavior or the habit of excessive smartphone usage.

### 2.4. Persuasive Technology and The Fogg Behavior Model

Further discussion of The Quantified Self and Social Impact Theory evolves into Persuasive Technology, an entity that encompasses notions of both constructs.
Persuasive Technology is essentially comprised of digital products and services designed to change users’ behaviors using persuasion and social influence (Fogg, 2002); it is, simply put, technology that changes what people think and do. These technologies are available to people in forms of websites, social networks, and smartphone applications (specifically The Quantified Self ones), video games, etc.

B. J. Fogg in 2002, in coining the term, stated that “These products persuade by giving a variety of social cues that elicit social responses from their human users.” (p. 89) The application noible presented in this research study is fundamentally a persuasive technology application that focuses on persuading users to change their social behavior and increase face-to-face interaction. It encompasses behavioral design principles in a systematic way to influence the desired behavior, and uses social influence and external incentives to achieve the outcome.

2.4.1. The Fogg Behavior Model

Efficiently designing and evaluating a persuasive technology is quite daunting. Fogg’s (2009) model for “understanding the drivers of human behavior” (p. 40), called the Fogg Behavior Model, provided a rock-solid foundation to the design and development process of noible. The Fogg Behavior Model is comprised of three major elements: motivation, ability, and trigger. Fogg (2009) stated that “the model asserts that for a target behavior to happen, a person must
have sufficient motivation, sufficient ability, and an effective trigger. All three factors must be present at the same instant for the behavior to occur.” (p. 40) In the context of nobile, the specific desired behavior is increasing face-to-face interaction or conversation, and nobile itself functions as the trigger. The concept of nobile can be explained in more detail through the Fogg Behavior Model as discussed further below.

Figure 2.1. The Fogg Behavior Model.
In order to design an effective persuasive technology to encourage people to perform a given target behavior, all three major elements of the Fogg Behavior Model and their components must be individually considered and implemented.

**Motivation.** Users must ideally be motivated to perform the target behavior, thus increasing or artificially creating motivations will help them to change their behaviors. Fogg (2009) has developed a framework that has three core motivators, each with two sides.

*Motivator 1. Pleasure or Pain.* The first motivator is related to “primitive responses related to self-preservation,” (Fogg, 2009, p. 43). Virtually no rationalization is required for this motivator so it thus provides an instant *in-the-moment* result.

*Motivator 2. Hope or Fear.* The second core motivator is “characterized by anticipation of an outcome as evidenced in everyday behavior” (Fogg, 2009, p. 43) whether it is good or bad.

*Motivator 3. Social Acceptance or Rejection.* The third motivator is pretty self-explanatory because it encompasses two aspects linked to the roots of human nature. “It’s clear that people are motivated to do things that win them social acceptance, and avoid being socially rejected” (Fogg, 2009, p. 44). Social motivation is very powerful and has become one of the most preferred methods in the design of persuasive technologies.
Ability. The second major element in the Fogg Behavior Model is ability, i.e., simplicity or ease of use, and persuasive technology design relies heavily on it because “simplicity changes behaviors” (Fogg, 2009, p. 44). Fogg’s (2009) framework of ability is comprised of six interdependent factors:

*Time.* If the target behavior requires too much time, then it is not simple.

*Money.* If the target behavior is costly, then it is not simple

*Physical Effort.* If the target behavior requires an exertion of physical effort then it is not simple.

*Brain Cycles.* If the target behavior forces people to rationalize, then it is not simple.

*Social Deviance.* If the target behavior requires people to “go against the norm”, or “break the rules of society” (Fogg, 2009, p. 45), then it is not simple.

*Non-Routine.* If the target behavior is non-routine or non-habitual, then it is not simple.

**Triggers.** Fogg (2009) explains that “generally, people have at least a modest level of motivation and ability, and these levels can be manipulated. Effective persuasive technologies must boost either motivation or ability or both,” (p.42) then trigger the target behavior. Simply put, a trigger is any type of reminder, call to action, or cue that prompts user to perform the target behavior (Fogg, 2009). For instance, Twitter’s “Follow Me” button is a trigger, as are the Facebook Notifications.
A trigger is the final ingredient of successful persuasive technologies because they encourage people to make compulsive decisions that can change behaviors, but if exceeded the whole design can be ruined. Fogg (2009) describes three types of triggers in his framework. They are:

- **Spark.** When a person lacks motivation to perform a target behavior, *spark* provides motivation, then triggers the target behavior.

- **Facilitator.** When a person is motivated but lacks ability, *facilitator* makes behavior simpler, then triggers the target behavior.

- **Signal.** When a person has both motivation and ability, *signal* prompts performance of the target behavior.

### 2.4.2. Persuasive Technology Design Process

Creating successful products with persuasive goals and designing digital experiences that influence people can be challenging because there is no single right way to do it. In order to provide more efficient and uncluttered workflow, Fogg (2009) has proposed a systematic eight-step design process for creating successful early-stage persuasive technology designs, and it has been the guideline for many persuasive technology efforts, including *nobile*. According to Fogg (2009), persuasive technology efforts often fail because designers tend to set excessively ambitious goals of persuasion and behavior change, making them too broad and
unmeasurable. Fogg’s eight-step design narrows the design process down to its essential core and relies on design thinking and small iterative tests to produce a series of measurable successes. Figure 2.2 shows the design process. The steps do not necessarily have to be performed in this particular order.

Figure 2.2. Eight Steps in Early-Stage Persuasive Design
**Step 1. Choose a simple behavior to target.** This is the most important step of the persuasive technology design process. As discussed earlier, designers often fail because they set goals that are too broad. Fogg (2009) suggests that “the design team should aim for the smallest, simplest, yet important behavior that matters,” (p. 45). Small goals are easy to measure, and likely to lead to bigger successes.

**Step 2. Choose a receptive audience.** The second step is as important as the first because the diffusion of the persuasive technology depends on it. Fogg (2009) advocates “choosing the audience most likely to be receptive to the targeted behavior change,” and “familiar with the technology channel,” (p. 45). Simply put, targeting innovators or early adopters (Rogers, 2005) is effective.

**Step 3. Find what is preventing the target behavior.** Fogg (2009) writes that the answer to this question is related to lack of one or more of the elements of motivation, ability, and trigger. The Fogg Behavior Model was discussed in the previous section.

**Step 4. Choose an appropriate technology channel.** Modern society has many technology channels and mediums, so choosing only one can be daunting. The first three steps help in narrowing the choices, and Fogg (2009) notes that the “design team must select technology familiar to the target audience,” because “learning a new channel and simultaneously adopting a new behavior,” (p. 47) rarely works.
**Step 5.** Find relevant examples of persuasive technology. Essentially, this step means doing extensive research on the target behavior and similar persuasive technology efforts benefits and simplifies the design process. (Fogg, 2009)

**Step 6.** Imitate successful examples. Fogg’s (2009) persuasive design process is focused on speed and efficiency. To validate the behavioral change as well as the design concept quickly, he suggests imitating successful examples that can provide a solid foundation to the design process.

**Step 7.** Test and iterate quickly. This step is pretty self-explanatory. Once enough data is collected regarding successful examples, the design team “should test various persuasive experiences quickly and repeatedly. A series of small, rapid tests will teach more than one big test,” (Fogg, 2009, p. 48).

**Step 8.** Expand on success. Once the persuasive technology concept is validated and proven to be effective at changing the target behavior, “the design team should expand on this success,” (Fogg, 2009, p.48).

It is rather clear that human behaviors are sophisticated and there is no specific right way to design for them. Therefore, “Small, measurable successes should be highly valued in the field of persuasive technology,” (Fogg, 2009, p. 49), and this approach was used during the design process of the *nobile* application discussed further below.
2.5. Current Research & Development Efforts and Applications

Research findings and analysis of current efforts in society to reduce the use of smartphones, and tools designed for that particular purpose are presented and discussed below.

Table 2.2. Current R&D Efforts and Applications

<table>
<thead>
<tr>
<th>Name</th>
<th>Facilitation</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Phone Stack</td>
<td>Stack the phones in the middle of the table and first one reach the phone gets the bill.</td>
<td>When any participant gives in during the challenge, the game offers no motivation to continue or start a new.</td>
</tr>
<tr>
<td>Restaurant Discounts and Surcharges</td>
<td>Offers discounts if turned off or turned in the phone, surcharges if used.</td>
<td>Collecting the phone is too imposing, and difficult to track phone’s really turned off.</td>
</tr>
<tr>
<td>UNICEF Tap Project</td>
<td>Challenging users to ignore smartphones for 10 minutes.</td>
<td>Restricted to 10 minutes timeframe, and ineffective during social gatherings.</td>
</tr>
<tr>
<td>Beer Mode</td>
<td>Switches users’ phone into a mode that automatically posts and replies to social media accounts</td>
<td>Brand focused, and possibility of misunderstanding with others as the application cannot fully understand human conversation.</td>
</tr>
<tr>
<td>Lively</td>
<td>Encourages people to ignore their phones during concerts</td>
<td>Situation based. Only effective during select music events.</td>
</tr>
</tbody>
</table>

2.5.1. The Phone Stack

Modern society seems to be overrun with technology. As discussed earlier, it has become challenging to socialize or converse without being constantly interrupted by beeps and vibrations of smartphones and someone having to respond
to them. Social efforts towards exempting people from cell phones and smartphones to prevent communication breakdown are underway. Somewhere between 2012 and 2013, a new social game called “The Phone Stack,” or informally known among people as “Don’t Be A D*** During Meals With Friends,” emerged and clearly struck a chord. Caroline Tell (2013) of The New York Times writes, “The phone stack game is a lighthearted way for friends to police against boorish behavior when eating out. The game gained popularity last year after Brian Perez, a dancer in Los Angeles, posted the idea on his Tumblr page. It has since spawned numerous blog posts and an entry in the Urban Dictionary, and is searchable using the hashtag #phonestack on Instagram,” (para. 3). The Urban Dictionary defines it as “A game that takes place usually over a meal or any social gathering in an attempt to get everyone to actually interact with each other as opposed to being glued to their smartphone screens,” (“Phone stack,” 2013, para. 1).

Simply explained, the rules of the game are as follows,

1. The game starts at the beginning of a social gathering
2. Everyone involved puts their phones face down at the center of the table
3. No one is allowed to pick up their phone during the social gathering
4. The first one to pick up the phone loses the game and pays the bill
5. If no one picks a phone, everyone pays their own bills
6. The game ends when the bill comes.
The public welcomed the game with open arms, and praised it. Dave McGinn (2012) of *The Globe and Mail* salutes the game as “Brilliant!” (para. 2) and "It’s a brilliant piece of social engineering, masquerading as a bar game,” writes Russel Brandom (2012) of Kempt, a men’s fashion publication (para. 5).

The Phone Stack game has had huge design implications on *nobile*. Although the game concept has some similarity to *nobile* as presented in this thesis, the priorities are different because *nobile* is designed to reduce the use of technology through technology itself. The biggest limitation of The Phone Stack is that, when any participant picks up in the middle of the challenge, the game offers no motivation to continue or start a new challenge, so everyone picks up their phones.

### 2.5.2. Restaurant Discounts and Surcharges

One of the most common places where people regularly commune are restaurants or diners, and such enterprises have devised an effective effort towards encouraging less smartphone usage. Implementing the concept of discounts, markups, or surcharges to deter smartphone usage has proven to be effective.

A restaurant called Eva in Los Angeles, California “offers diners a 5% discount for leaving their phones with the receptionist for the entirety of the meal,” (Heller, 2013, para. 14). Bedivere Eatery and Tavern in Beirut offered a 10% discount and, according chef Mark Gold who owns the restaurant, estimated a
percentage of “40% to 50% of customers who have opted in and ditched their phones,” (Kim, 2012, para. 2). His effort has gained widespread recognition and was featured on CNN, Good Morning America and, during an AirTalk interview on Southern California Public Radio with Larry Mantle (2012), he said “We want people to connect again. It’s about two people sitting together and just connecting, without the distraction of a phone, and we’re trying to create an ambience where you come in and really enjoy the experience and the food and the company,” (para. 12).

Reportedly, a restaurant called Abu Ghosh just outside Jerusalem has offered a steep discount of 50% and adopted a similar concept with a twist of turning the phone off instead rather than giving to the receptionist. The owner of the restaurant Jawdat Ibrahim says, “I’m changing something. It might be something small, but maybe in some small way I’ll be changing the culture of eating,” and adds "I have a lot of new customers," (cited by Heller, 2013, para. 3).

Another intriguing method incorporated by a Deli in Vermont is the idea of imposing a markup or surcharge on the bill when one uses a smartphone while ordering (see Figure 2.3). This was reported as being very effective as well as an “income booster”. (Northrup, 2012, para. 2)

The trend of implementing discounts, markups, or surcharges is rising as more and more restaurants and diners around the world appear to be adopting such concepts. Arguments can be made that collecting the phone is too big an imposition,
or it may be difficult to determine whether one has only activated the silent mode instead of really turning the phone off. The application described in this research study proposes a possible solution for both arguments, as will be discussed further below.

![Figure 2.3. Surcharging the Bill](image)

2.5.3. The UNICEF Tap Project

The UNICEF Tap Project is a nationwide fundraising campaign to help children in need of clean water around the world. For every 10 minutes users abstain from smartphones, “UNICEF’s sponsor donates funding to provide one day's worth of clean drinking water to a child in need,” (Sorokanich, 2014, para. 2). The UNICEF
Tap Project is a web browser-based tool, which is unusual, and it uses the motion sensors of the device to detect user activity as to whether the device is active and being used, is idle, or is ignored.

First implemented in 2007, the campaign has been arguably the biggest initiative that promotes less smartphone usage up till now and, according to The UNICEF Tap Project website (http://tap.unicefusa.org/), people have spent over 200 million minutes ignoring their phones. It appears that the biggest advantage of
The UNICEF Tap Project is the motivation behind it, the emphasis on humanitarian aid, giving an incredible core value to the tool.

A limitation of The UNICEF Tap Project is that it can be restricted to a ten-minute time frame, and it may be ineffective during social gatherings because it is designed as a non-collaborative self-challenging tool.

2.5.4. Beer Mode

Beer Mode is a smartphone application launched by the New Belgium Brewery Co., best known as the makers of Fat Tire beer. The application was developed by Made Movement and is “described as ‘anti-app’ by the makers”. It switches users’ phones into a mode that “automatically posts preselected messages to social networks such as Facebook and Twitter” (Young, 2013, para. 6) so its users can put down their phones and socialize with others.

Users set the time and choose from among several different personas, then Beer Mode “takes over the social media accounts, posting messages every 30 minutes for a maximum of two hours and, when someone comments on a post, Beer Mode responds with one of up to five replies” (“Beer mode.”, 2013, para. 3) without users having to be involved. In addition, Beer Mode allows users to browse New Belgium's beers and write reviews.
Although the application encourages people to put their phones away, Beer Mode’s first priority is promotion of the brand “New Belgium” and its beers. It obviously is also promoting alcoholic beverages. In addition, Beer Mode can lead to misunderstandings with others when selecting predefined posts and replies, because the application cannot be expected to fully understand human conversations.

2.5.5. Lively

One of the main reasons why people reach out for their smartphones during live concerts is to record the moment they are experiencing. Lively is a smartphone application that delivers recordings of live concerts, so people can enjoy the moment without the distraction of smartphones. Although Lively encourages people to put
their smartphones down, its biggest limitation is its being situation-based. The application also is only effective during selected live shows and music event.

![Lively Interface](image)

Figure 2.6. Lively Interface

### 2.5.6. AppFavorit.es

AppFavorit.es is a quantified self application designed to measure one’s interactions with loved ones by creating a list of favorites and reminding users to get in touch with each if they have not done so during the past week. It does not encourage people to strive towards less smartphone usage, but its similarity to the other applications is that it promotes meaningful communications and interactions. Although AppFavorit.es has not yet gained widespread recognition and is still in early stages of development, the concept appears to have potential.
2.6. Summary

In conclusion, the phenomenon of excessive smartphone usage appears to be common among people between the ages of 18 and 29, and it is likely that they are the most receptive audience with respect to new technologies and innovations. They carry smartphones and rely on communication technologies to keep in touch with others on a daily basis. Also, they are not bothered by self-tracking some aspects of their lives to achieve greater benefits in health, weight, productivity, and other health-related factors. However, it appears that reliance on smartphones has still been disrupting how communication occurs among people who are becoming too dependent on technology, with reduction in face-to-face interaction and direct conversation.

Persuasive technology applications (Fogg, 2002) are designed to positively change human social behavior and beneficially impact society. The application created for this study, nobile, aims at increasing face-to-face interactions and conversations. The Fogg Behavior Model (Fogg, 2009) was used as the basis of nobile’s social behavior change concept, and the application was designed in accordance with the principles of Fogg’s (2009) Eight Step Design Process for Early Stage Persuasive Application. Moreover, nobile is partly a quantified self application through its functionality of measuring a smartphone’s non-usage time. The last piece of the puzzle is collaboration, because people may differ but still affect and influence
one another in accordance with Social Impact Theory (Latane, 1981) and are most
likely to feel impacted or persuaded socially.

Although few seem to be bothered by a lessening of face-to-face interactions,
not realizing how critical they are, some have been making attempts to stop or
prevent this diminution. It appears that current efforts aimed at reducing the
excessive usage of smartphones have not gained widespread recognition except for a
small subset of the population. Technology will undoubtedly continue to innovate,
and smartphone usage will continue to increase. It is unlikely that people will stop
using technology once and for all; the only efficient solution would thus be to fight
technology overconsumption with technology in order to achieve appropriate
balance.
CHAPTER 3. DESIGN AND DEVELOPMENT

This chapter explores through the design and development process of nobile application. A working version with basic functionalities was developed and used for concept validation, usability evaluation, as well as the its effects on users. nobile was designed to be friendly to smartphone users across various cultures.

3.1. Ideation, Concept and Prototyping

People seem to be immersed in their smartphones, “physically present in one space, yet mentally and emotionally engaged elsewhere” (Baym, 2010, p. 3), sitting together but not interacting. Ubiquity of this phenomenon sparked the design problem “How to encourage people to put their smartphones and converse?”

Clearly, in this digital age, completely avoiding smartphone use is simply impossible and impractical. Therefore, the most applicable design approach was to fight excessive smartphone usage through a smartphone application. After conducting extensive research on this particular design problem, the idea of a collaborative social game application for smartphones was formed. The game’s basic premise is immensely straightforward, which is “If you use your smartphone, you lose points, if you do not, you earn points.” Further elaborated, during social situations, one would challenge others through this application to put their
smartphones down, and compete by not picking the smartphones up. Hypothetically, as a result, parties involved in the challenge will use their smartphones less; thus face-to-face interaction and conversations will increase.

Based on the above reasoning, nobile was created as fundamentally a persuasive technology application (Fogg, 2002) that focuses on positive social behavior change, and designed based on the principles of The Fogg Behavior Model (Fogg, 2009) and Eight Step Process in Early-Stage Persuasive Design (Fogg, 2009) as mentioned on the Review of the Literature section.

3.1.1. The Fogg Behavior Model and nobile

As mentioned earlier, the Fogg Behavior Model (see Figure 2.1) asserts that “for a target behavior to happen, a person must have sufficient motivation, sufficient ability, and an effective trigger” (Fogg, 2009, p. 40). The target behavior in nobile context is social behavior. nobile application acts as the trigger, and is designed for iOS and Android smartphones, which combined take up over 90% of the smartphone marketshare (Pendola, 2014), hence ability aspect was considered as resolved. Also, any major usability, ability, issues found were to be fixed.

The next big challenge of the design process was implementing motivation factors, the incentives to encourage and persuade people to use nobile. It was safe to assume that a small subset of the population is already motivated and eager to
adopt various applications to self-track some aspects of their life (Swan, 2013) but for the early majority (Rogers, 2005) to join in, motivation factors needed to be addressed thoroughly. As discussed earlier in The Social Impact Theory (Latane, 1981), social influences are the primary motivation factor in the adoption of certain behaviors (Centola, 2013). Social influence falls within the Motivator 3. Social Acceptance or Rejection category of The Fogg Behavior Model.

A simple hypothesis can be made up based on the social influence motivator that nobile challenge will be more successful during social situations when played collaboratively with others, compared to self-challenges.

Logically, social situations or gatherings are directly correlated with venues where people regularly commune, such as restaurants, coffee shops and bowling alleys, meaning that parties involved are likely to be physically together somewhere. This correlation encouraged the second motivator, discounts and coupon offers from venues, which proved to be powerful later in the study. This motivator is related to Motivator 2. Hope or Fear of The Fogg Behavior Model.

When smartphones are down, presumably, there will be a certain pressure among people to start a conversation and interaction. In order to lighten up that pressure, “Suggest a Starter” feature and the third motivator was implemented. Essentially, it is a button that suggests random, yet fun and engaging, conversation starter questions during the nobile challenge. Now the basic nobile scenario can be
rewritten as “One challenges others to put their smartphones down, application suggests conversation questions during the challenge, and the winner gets a discount from the venue.”

3.1.2. Eight Steps in Early-Stage Persuasive Design
Once The Fogg Mental Model principles were applied to the \textit{nobile} concept, design process marched on to adapting the Eight Steps in Early-Stage Persuasive Design proposed by Fogg (2009) to \textit{nobile}. (see Figure 3.2).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure32.png}
\caption{Early-Stage Persuasive Design Principles adapted to \textit{nobile}}
\end{figure}
Step 1. Choose a simple behavior to target. In nobile context, the target behavior is social behavior and when broken down to its simplest form, it is face-to-face interaction or conversation. Step 2. Choose a receptive audience. As discussed earlier, people between the age of 18-29 are avid users of smartphones, and likely to be the most receptive audience and early adopters. Step 3. Find what is preventing the target behavior. Excessive smartphone usage is disrupting how communication occurs between people. Step 4. Choose an appropriate technology channel. The most applicable solution is to reduce the excessive smartphone usage through a smartphone application. Steps from 5 to 8 are pretty straightforward as explained in the previous chapter.

3.1.3. The Information Architecture

Initial, yet concrete design concept had been established; thus the iterative design process begun. The very first step was to develop an effective information architecture for the application based on the concept. It was the most crucial step, as successful information architecture design “clarifies the mission and vision and determines what content and functionality the product will contain,” and “specifies how users will find information in the product by defining its organization, navigation, labeling, and searching systems,” (Rosenfeld & Morville, 2002, p. 13). After several iterations, the following architecture was designed.
Figure 3.3. The Information Architecture of nobile
3.1.4. Prototyping

Since the application’s organization, navigation, labeling, and functionalities had been specified, next phase of the design process was rapid prototyping. It started with rough wireframes, then interactive low-fidelity prototype, and proceeded to the high fidelity design. Balsamiq Mockups was used to design the initial wireframes, and the interactive low fidelity prototype was created on JustInMind Prototyper. Highly-respected Design professors critiqued both of these prototypes (Figures 3.4 - 3.9). High fidelity version was created based on the critiques, and the feedbacks gathered from the pilot testers. *nobile’s* development codename was Quokka which is shown on the figures below.

Wireframes

![Wireframes](image.png)

Figure 3.4. Home Screen  
Figure 3.5. Profile  
Figure 3.6. Challenge
Interactive Low Fidelity Prototype

Figure 3.7. Home Screen

Figure 3.8. Profile

Figure 3.9. Challenge

High Fidelity

Figure 3.10. Home Screen

Figure 3.11. Profile

Figure 3.12. Challenge
3.2. Interface Design

After three iterations of prototyping, from wireframes to low fidelity to high fidelity, the final interface design process had begun.

3.2.1. Color, Icons, Typeface, and Design Style

Yellow was chosen as the primary color because it is conventionally associated with warnings, as well as the cross-cultural meanings and representations (Birren, 1961). “Yellow is the most visible color of the spectrum, and the human eye processes yellow first” (“The Meanings of Yellow”, para. 2). It also represents happiness, and according to Smith (2013) color yellow’s effects include stimulation of mental processes, and activates memory and encourages communication, characteristics that all fit accordingly to nobile application. However, when overused, yellow can have disturbing effects; thus layout items that need emphasis such as logos, buttons, and titles were highlighted in yellow.

nobile logo was designed using Avenir typeface in Heavy weight with tracking of minus twenty-five, and is represented either in yellow on dark backgrounds, or in black on yellow backgrounds. Although, texts in the interface design were styled with Avenir typeface with Light and Roman weight, they were temporarily switched to Montserrat in Regular on the developed prototype, a free typeface that is loosely similar to Avenir.
nobile interface design demonstrates a prominent flat interface style, but it is distinctive from the mainstream flat design through its usage of background images as the whitespace instead of solid minimal colors. Overall, the design is modern, and typography oriented, and only three different icons were used besides the nobile application icon, which are menu (represented in three bars), close (conventional 45 degrees rotated cross), and back (backward arrow). (see Figure 3.13)

![nobile icons and typeface](image)

Figure 3.13. Color, Icons, and Typeface

3.2.2. Final Interface Design

The final prototype for the study was developed based on the user interface designs presented below (See Figure 3.14 - 3.31). All functionalities, including prompting users to put the smartphones down, tracking smartphone usage through motion sensors, measuring smartphone usage time, and suggesting conversation starter questions were implemented.
Figure 3.14. Launch Screen
Figure 3.15. Sign Up
Figure 3.16. Sign In
Figure 3.17. Home Screen
Figure 3.18. Central Menu
Figure 3.19. Friend Requests
Figure 3.20. Find Friends

Figure 3.21. Profile

Figure 3.22. Edit Profile

Figure 3.23. Edit Password

Figure 3.24. Check-In

Figure 3.25. Invite Friends
3.2.3. User Scenario

Zack is meeting his two close friends at a local restaurant. He wants to have a good time with them for a few hours without being interrupted by anything. But one of the friends kept checking the smartphone regularly, making it hard to have a conversation. So Zack decides to challenge his friends to put their smartphones down using nobile application.

Zack opens nobile application on his smartphone (Figure 3.14). He clicks Sign In and enters his username and password (Figure 3.16).

When the home screen is loaded Zack clicks on Start a Challenge (Figure 3.17) button to challenge his friends, and proceeds to Check-In (Figure 3.24) screen.

Check In screen brings up current location information and local restaurant discount prize for the winner of the challenge. Zack checks in and presses Continue.

Invite Friends (Figure 3.25) screen comes up and shows a list of friends who have already friended Zack on nobile.

Zack scrolls up and down, and uses search input then finds the friends’ accounts whom he is with and clicks on Invite button. After that, he clicks on Begin Challenge.

The application prompts to put the smartphone down (Figure 3.29). Once everyone accepted the invite and put the smartphones down the challenge begins.
If the smartphone is down Zack earns minutes (Figure 3.31). When he picks up the smartphone, it vibrates, and the texts turn red then starts blinking to indicated that he is losing minutes. (Figure 3.31).

From time to time one of the friends presses Suggest Me button to get a random conversation starter questions, and to start interesting and fun conversations. (Figure 3.26)

The challenge continues for 60 minutes. Zack clicks on the close button to end the challenge (3.26). Zack had won, so application gives him a QR code to claim the discount prize (Figure 3.27). On his friends’ smartphone, it shows You Lost! screen (Figure 3.28).

3.3. Development

The prototype of nobile was developed using Java programming language in order to build a native Android OS application, and no third party frameworks were used. User interface elements were declared through XML, the most common layout building method in Android application development. All the code was written in Eclipse IDE. The application’s minimum required SDK version is “9” which is equivalent to Android 2.3 Gingerbread, and the target or recommended SDK version is 14, that is Android 4.0 Ice Cream Sandwich or above.
On the back-end, Python was used to interact with MySQL database and store information, and Google Cloud Messaging Server (GCM Server) was implemented in order to send messages to the GCM-enabled client application, *nobile*, and receive messages from the application server, through JSON strings with HTTP POST/GET/PATCH/DELETE requests, so the people partaking in a *nobile* challenge can see each other’s progress in realtime. It is required for smartphones to be connected to the Internet. However, for the scope of the research study, participants were only allowed to use dummy information during the usability study sessions as Institutional Review Board (IRB) instructed. Therefore, database storage functionality was omitted from the prototype and *android.content.SharedPreferences*, “An interface for accessing and modifying preference data” ("SharedPreferences," 2014, para.1) was used in order to temporarily store users’ login and profile data.

SlidingMenu library developed by Jeremy Feinstein was used to create the centralized menu of *nobile* that allows users to access various sections of the application. It is an open source library that allows developers to create applications with sliding menus like those made popular in YouTube, and Facebook mobile applications. (Feinstein, 2014) and its implementations can be seen on Android versions of FourSquare, LinkedIn and others.
Google Maps API was implemented on the Check-In screen, but the actual check-in feature was omitted from the prototype for the usability study and replaced with an image as obtaining participants’ actual location information was not covered in the IRB application.

The main component of nobile application is tracking and monitoring whether a smartphone is being used. After a user checks in and invites friends to the challenge, nobile application prompts to put the smartphone down. Once the smartphone is down and still, the challenge commences. Motion Sensors were used to track this motion, and also to monitor whether the smartphone is being used. It is considered the smartphone is in use based on the values returned by SensorEvent class when the smartphone tilts, shakes, rotates, or swings. According to Android Developers Documentation, “The Android platform provides several sensors that let you monitor the motion of a device. Two of these sensors are always hardware-based (the accelerometer and gyroscope)” (“Motion Sensors”, 2014, para. 3) and all of the motion sensors return multi-dimensional arrays of sensor values for each SensorEvent.

Android PowerManager.WakeLock class was used to keep the smartphone screen on throughout the nobile challenge. The device screen dims down but never turns off, so the user can easily access the challenge information.
In order to measure user’s time spent not using a smartphone, Android Service component is used. Service runs in the background discreetly and does not have an interface. If a user picks up the smartphone, the application indicates this action by vibrating the smartphone for a second, and it is executed through Android Vibrator class.

The biggest advantage of the nobile prototype is being a hundred percent native Android application. Native applications allow smoother, faster, and lightweight experience compared to the ones developed using third-party frameworks. Native applications respond more fluidly to gestures, and consume substantially less memory and CPU. Native applications can be integrated with the device hardware easily and communicate with Bluetooth, USB, camera, GPS, and others without hassle. In addition, native applications can be integrated seamlessly with other installed apps on the device. (Sundqvist, 2013)

There are two major limitations in the current nobile prototype. First one is high battery consumption as it is not letting smartphone’s screen turn off during the nobile challenge while listening to the motion censors. But for the scope of this study, nobile challenge time is only 5 minutes, thus the first limitation’s effect is not significant. Secondly, it is possible to use a smartphone without losing any score as long as the device is perfectly still and not tilted as the prototype only uses motion censors to track the device usage. In other words, currently it is possible to cheat.
However, using a smartphone perfectly still and not tilted is uncommon, and participants do not know about this possibility of cheating.

During the study data collection, these advantages and limitations were closely observed as reported on the Findings and Discussion chapter.
CHAPTER 4. METHODOLOGY

In order to evaluate whether people can be persuaded to put their smartphones down and converse face-to-face with each other, and to assess the usability of the application, a working prototype of nobile was developed for Android operating system, then participants were recruited and asked to evaluate the prototype. Participants performed a series of tasks including simulated no+mobile challenge on a Samsung Galaxy SIII Android smartphone. Participants’ interaction with the user interface and their voice were recorded using a smartphone screen recording software called REC. No images of the faces were captured in order to prevent the identification of the participants. Furthermore, participants completed questionnaires before and right after the study, and were interviewed regarding their experience with the prototype.

The methods used in this study are designed to pilot a methodology to assess applications and platforms related to social interactions.

4.1. Study Participants

A total of 15 participants between the age of 18 and 29 were recruited via email and word of mouth. According to Jakob Nielsen of Nielsen Norman Group, with 15 participants, investigator can identify most of the usability problems
(Nielsen, 2000). The participants were chosen based on Fogg’s Eight-Step Design Process principle “Choose a receptive audience” (Fogg, 2009, p. 45), defined as participants’ familiarity with the technology channel and likeliness of being receptive to the targeted behavior. Eleven participants were male, and four were female. All, except one, were students at a Midwestern university, and had varied backgrounds including psychology, design, education, and engineering. Eight of the participants were non-native English speakers and were from diverse cultural heritages. This was a particularly important aspect since nobile was designed to be friendly to smartphone users across various cultures. They all used or owned a smartphone as their primary mobile phone. All participants received compensation of $5 cash for their participation in the study. Identities of the participants were kept confidential throughout the study, and they were allowed to withdraw from the study anytime without penalty.

4.2. Methods

Following are the data collection methods, techniques and measures used to evaluate nobile application.
4.2.1. Questionnaires

Two different types of questionnaires were used before and after the validation test. The pre-questionnaire (Appendix A) addressed participants’ demographic information, usage of mobile devices and the Internet. The post-questionnaire (Appendix B) based on the System Usability Scale, “A simple ten item scale giving a global view of subjective assessments of usability,” (Brooke, 1996, p. 191) addressed noible application’s usability, and participants’ experience and satisfaction with the interface.

4.2.2. Validation Test

The validation test, or verification test, is a type of usability testing designed to be commissioned late in the development process, and prior to the product’s actual release (Rubin & Chisnell, 2008). The purpose of this usability testing is to find whether the “product meets the predetermined usability standards,” and if not, find out why (Rubin & Chisnell, 2008, p. 35). A series of tasks (see Table 4.1) were given to the participants to perform on noible application that was pre-installed on the device. Quantitative data collection was the main intent of the validation study, as well as a subset of qualitative data. The study addressed noible application usability, effectiveness in persuading participants to put their smartphones down and interact face-to-face.
4.2.2.1. Think-Aloud Protocol

Thinking aloud or “concurrent verbalization is a data elicitation method where the participants are asked to perform a task and to verbalize whatever crosses their mind during the task performance,” (Jaaskelainen, 2010, p. 371). The study participants were asked and encouraged to think-aloud while performing twelve tasks ranging from logging in to completing a challenge.

4.2.2.2. Behavior Observation

The application’s effect on participants’ behavior was observed by the researcher to measure application effectiveness in persuading participants to put their smartphones down. Observational study is defined as “direct observation of spontaneous behavior in groups of men and other animals,” (Altmann, 1974, p. 227).

The data collected from the study were analyzed both quantitatively (number of steps required to complete tasks, number of errors, etc.) and qualitatively (participants’ verbal feedback while working on the task, motivation to interact face-to-face or have conversation, reducing the use of smartphones, etc.) in order to evaluate the application. Names of the respondents were identified as pseudonyms.
4.2.2.3. Video Analysis

Participants’ interaction with nobile user interface while performing the usability tasks were recorded using a smartphone screen recording software called REC. The video recordings were analyzed individually in order to find task completion rates and average task completion time.

4.2.2.4. Researcher’s Notes

During the study sessions, the researcher took notes concerning any comments about the nobile application made by the participants, as well as the relevant observations of the participants’ behaviors. Researcher’s notes were primarily used when evaluating the qualitative findings.

4.2.2.5. Debriefing

After finished performing the usability tasks, participants were interviewed regarding their experience with the prototype. They were asked a total of nine questions, from whether they felt encouraged to put their smartphones down to what aspect of nobile application was the most frustrating to them (see Appendix F).
The usability study took place in a convenient place for the participants, and the sessions were scheduled at times that were appropriate to the participants. Participation was completely voluntary. Upon their arrival, participants were given a full detailed introduction about the study, then handed an informed consent form (Appendix C) to review and sign. They were allowed to ask questions regarding the study during the briefing. Participants were also allowed to refuse to partake or leave the study at any time without any penalty or loss of benefits to which they were otherwise entitled. If no questions were present, and the participants agreed to participate in the study and signed the informed consent form, the usability testing session proceeded.

The study started with a questionnaire regarding participants’ demographic information, usage of mobile devices and the Internet. The questionnaire informed the first research question “Do users excessively utilize smartphones?”. Completing the questionnaire took approximately fifteen minutes. After completion, participants were given a scenario where they imagined that they were at Starbucks with a friend (researcher played the role) and the venue was offering 10% discount to the nobile challenge winner. Then, participants were provided with an Android smartphone, Samsung Galaxy SIII, to perform a series of tasks on nobile application that was pre-
installed on the device. Jazz music was playing in the background to provide coffee shop atmosphere.

Participants were not given any time to explore and become familiar with the application, and the researcher provided either very little or no assistance. Tasks (see Table 4.1) were printed on a sheet of paper and handed to the participants. The participants were encouraged to think aloud while performing the tasks, which is essentially explaining their actions as they do them, and their interactions including tap, swipe and other gestures with the application interface, and voice were recorded using an Android screen recording software called REC, but their faces were not. The researcher took field notes during the session concerning any comments made by the participants and relevant observations of participants’ behaviors.

Almost all of the given tasks were very straightforward (see Table 4.1), as they were designed to assess the ease of use of the nobile interface. The performances of the tasks informed whether the second research question “Does the nobile user interface provide an effortless experience?” is true or not. Task 8 was an exception because this particular task had more emphasis on participants’ behavior, and informed the third research question “Does nobile incentivize non-usage of smartphones in social situations?”. Once participants checked into the pseudo Starbucks, then invited the pseudo friend “Zack”, they entered nobile challenge mode, Task 8, where
it prompts participants to put their smartphones down, and starts measuring their *nobile* time, which means the amount of time spent not using the smartphone (see Figure 3.26). Also, participants’ pseudo friend’s time was shown on the screen in order to give sense of realtime challenge.

### Table 4.1. Usability Tasks

<table>
<thead>
<tr>
<th>#</th>
<th>Task</th>
<th>Expected steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sign up</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Login to “nobile”</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>View your profile</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Edit your profile</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Find a friend named “Zack” and send a friend request</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Start a “nobile” challenge</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>Invite your friend “Zack” to the challenge</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Begin the challenge and go “no+mobile” for 5 minutes</td>
<td>1 / ∞ during the challenge</td>
</tr>
<tr>
<td>9</td>
<td>Finish the challenge</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Change password</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>Explore the application</td>
<td>∞</td>
</tr>
<tr>
<td>12</td>
<td>Sign out</td>
<td>2</td>
</tr>
</tbody>
</table>

The challenge duration was five minutes. The participants were given a scenario to imagine that they had received an email, and several Facebook notifications during the challenge. If participants picked up the smartphone to check those, the application indicated this action by vibrating the smartphone for a second,
then the time turned red and started blinking, reducing by 2 seconds with each blink, in order to stimulate the sense of losing, and to provide cues to put the smartphone down again.

A yellow and circle shaped widget (See Figure 3.28) that appears on top of the all other applications was designed and implemented in order to display *nobile* time, in case the participants closed *nobile* application without finishing the challenge. The widget turned red and blinked (See Figure 3.27) if the participants started using smartphone, so the participants were aware of losing *nobile* time. Moreover, “Suggest a Starter” (See Figure 3.28 & 3.29) feature and a button that suggests random conversation starter questions was implemented in order to encourage face-to-face interaction and conversation.

If the participants had won the challenge upon the completion of Task 8, their compensation of $5 cash was provided, in order to simulate the 10% discount prize from the venue, if not the compensation was given at the end of the study session. The application’s effect on participants’ behavior was observed by the researcher to measure application effectiveness in persuading participants to put their smartphones down, and to evaluate whether the participants’ were motivated to have face-to-face interaction or conversation. Performing the tasks took approximately 15 minutes.
Once participants completed the tasks, they were asked to complete a brief post-survey based on The System Usability Scale (Brooke, 1996) regarding their experience and satisfaction with the interface, which took approximately 5 minutes. When participants were done with the questionnaire, they answered a few brief interview questions concerning if they felt motivated to interact face-to-face, have a conversation with others, and put their smartphones down. Summary of the study findings informed the fourth research question “Do users feel persuaded to change their social behavior and converse with the aid of nobile?”, as well as the last research question “Can nobile be used as a platform for conducting research studies with respect to social interactions?” The usability study session concluded by compensating the participants and thanking for their participation. Each study session took approximately 60 minutes or less. This research study was approved by the university human subjects protection office.

4.4. Predictions

As discussed earlier in previous chapters, people have already been persuaded to use smartphones regularly, in many cases excessively, and, as a result, interpersonal communication has been disrupted, and social behavior is being shaped. The goal of this research study was to evaluate how effective nobile would be in encouraging people to have face-to-face interactions and reducing excessive
use of smartphones, and to pilot a methodology that can be used to assess applications and platforms related to social interactions. The data collected from the study were analyzed both quantitatively and qualitatively.

Quantitatively, the first prediction is that people are using smartphones excessively, and applications like *nobile* are in demand. Secondly, *nobile’s* interface will provide effortless experience, and the learning curve will be easy; thus participants will experience very little to no confusion interacting with the application, and understanding how the application works.

Qualitatively, with the persuasive technology application presented in this research study, a hypothesis can be made up that participants will feel persuaded to have more face-to-face interaction and conversation during social gatherings. Moreover, the participants will reduce their usage of smartphones, and their social behavior will have positive effects. Furthermore, Latane (1996) and Fogg (2009) work suggested that discounts, social influence and collaboration would be the main motivation factors.
CHAPTER 5. FINDINGS AND DISCUSSION

5.1. Demographics

There was a total of 15 participants. Two participants were between the age of 18 and 21 (13%), eight participants were between 22 and 25 (53%) the majority, and five participants between 26 and 30 (33%) (see Table 5.1). Eleven of the participants were male (73%) and five were female (27%) (see Table 5.2). Seven of the participants (47%) identified themselves as native English speakers, two participants (13%) as Mandarin or Cantonese speakers, one for each Spanish (7%), Arabic (7%), and Hindustani (7%) respectively, and three participants (20%) spoke other languages that were not listed in the questionnaire (see Figure 5.1). Eleven of the participants responded that they had Bachelor’s degree (73%), and four had Master’s degree (27%) (see Table 5.3). All participants (100%) used or owned a smartphone as their primary mobile phone. Android smartphone was the majority among participants as nine participants (60%) used Android, five used iPhone (33%) and only one participant (7%) used Windows Phone (See Figure 5.2). According Pew Research Center study (2014), smartphone usage of those who have attended or finished college are significantly higher than those who have not (“Mobile technology fact,” 2014). The participants in this study match this profile in addition to being excessive smartphone users, as shown below.
Table 5.1. Age Demographics

<table>
<thead>
<tr>
<th>#</th>
<th>Age</th>
<th>Participants</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18-21</td>
<td>2</td>
<td>13%</td>
</tr>
<tr>
<td>2</td>
<td>22-25</td>
<td>8</td>
<td>53%</td>
</tr>
<tr>
<td>3</td>
<td>26-30</td>
<td>5</td>
<td>33%</td>
</tr>
</tbody>
</table>

Table 5.2. Gender Demographics

<table>
<thead>
<tr>
<th>#</th>
<th>Gender</th>
<th>Participants</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td>11</td>
<td>73%</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>4</td>
<td>27%</td>
</tr>
</tbody>
</table>

Table 5.3. Education Demographics

<table>
<thead>
<tr>
<th>#</th>
<th>Education</th>
<th>Participants</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bachelor’s degree</td>
<td>11</td>
<td>73%</td>
</tr>
<tr>
<td>2</td>
<td>Master’s degree</td>
<td>4</td>
<td>27%</td>
</tr>
</tbody>
</table>

Figure 5.1. Native Language Demographics

- English (7) 47%
- Arabic (1) 13%
- Spanish (1) 20%
- Hindustani (1) 7%
- Mandarin/Cantonese (2) 7%
- Other (3) 7%
5.2. Results from the Pre-Questionnaire

A summary of key quantitative findings are presented below.

- On an average day, approximately 67% of the participants spend at least 2 hours on smartphones, more specifically, 47% spend 2 to 4 hours, 7% spend 4 to 6 hours, and 13% spend over 6 hours. This translates into at least 14 or more hours are spent being immersed into smartphones every week.

- Majority of the participants (80%) spend at least one hour on social networks everyday, and Facebook being the most used social networking site among participants, followed by YouTube and LinkedIn.

- Participants have, on average, 150 or more connections on social networks.
• Social networking and checking or sending emails are the most popular activities on smartphones, and nearly 53% of the participants find themselves using their smartphones during social situations. Only 7% never use smartphone during social situations.

• Approximately 40% of the participants admit that they regularly check their smartphones in the bathroom, and also often spent some time on smartphones before going to sleep and just after waking up.

• Thirty-three percent of the participants prefer text messaging and emailing over face-to-face interaction when getting an advice or consulting.

• Majority of the participants (74%) agree that they feel uncomfortable without smartphones, and 60% of the participants feel social stress (having to reply messages, emails, Facebook notifications) when they use smartphones.

• Forty-three percent of the participants say when they are not using smartphones, the pressure to have conversation with someone bother them.

• Almost all (87%) of the participants say that they spend more time on smartphones than they expect. 67% feel they are using smartphones a lot, and says have attempted and will strive to reduce their smartphone usage.

• Seventy-four percent of the participants agree that they cannot live without their smartphones.
• Restaurant is the place where people usually meet, and discount is an important factor in choosing a venue.

• Eighty-seven percent of the participants agree that they would visit more if the venues offered discounts or coupons when they do not use smartphones.

• Also they say if there was a free app that offers discounts or coupons if they do not use their smartphones, they would use it.

Table 5.4. Smartphone Usage on an Average Day

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Participants</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Less than 2 hours</td>
<td>5</td>
<td>33%</td>
</tr>
<tr>
<td>2</td>
<td>2 hours to 4 hours</td>
<td>7</td>
<td>47%</td>
</tr>
<tr>
<td>3</td>
<td>4 hours to 6 hours</td>
<td>1</td>
<td>7%</td>
</tr>
<tr>
<td>4</td>
<td>6 hours or above</td>
<td>2</td>
<td>13%</td>
</tr>
</tbody>
</table>
Figure 5.3. Social Network Usage among Participants

Figure 5.4. Time Spent on Social Networks on an Average Day
Figure 5.5. Number of Friends/Followers on Social Networks

Table 5.5. Smartphone Activities (see Figure 5.6)

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Social networking</td>
<td>67%</td>
<td>27%</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>Checking and sending email</td>
<td>73%</td>
<td>20%</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>3</td>
<td>Reading news and contents</td>
<td>60%</td>
<td>40%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>4</td>
<td>Web browsing and searching</td>
<td>60%</td>
<td>40%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>5</td>
<td>Text messaging</td>
<td>60%</td>
<td>20%</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>6</td>
<td>Getting directions</td>
<td>60%</td>
<td>33%</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>7</td>
<td>Playing games</td>
<td>7%</td>
<td>7%</td>
<td>60%</td>
<td>27%</td>
</tr>
<tr>
<td>8</td>
<td>Managing finances and bills</td>
<td>7%</td>
<td>33%</td>
<td>40%</td>
<td>20%</td>
</tr>
<tr>
<td>9</td>
<td>Listening to music</td>
<td>47%</td>
<td>20%</td>
<td>27%</td>
<td>7%</td>
</tr>
<tr>
<td>10</td>
<td>Watching videos</td>
<td>33%</td>
<td>40%</td>
<td>20%</td>
<td>7%</td>
</tr>
</tbody>
</table>
Figure 5.6. Smartphone Activities

Table 5.6. Smartphone Usage in Various Situations

<table>
<thead>
<tr>
<th>#</th>
<th>Situations</th>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Idle time at work or school (during breaks, lunch, boring meetings/classes, etc.)</td>
<td>93%</td>
<td>7%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>2</td>
<td>Riding the bus, train, or in car as passenger (commute)</td>
<td>80%</td>
<td>20%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>3</td>
<td>Waiting in line (examples: coffee shop, grocery store, for movie to start, picking up kids, etc.)</td>
<td>67%</td>
<td>33%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>4</td>
<td>While hanging out with friends, family and peers.</td>
<td>0%</td>
<td>47%</td>
<td>53%</td>
<td>0%</td>
</tr>
<tr>
<td>5</td>
<td>While at restaurants, bars, etc</td>
<td>7%</td>
<td>53%</td>
<td>40%</td>
<td>0%</td>
</tr>
<tr>
<td>6</td>
<td>While at parties</td>
<td>0%</td>
<td>64%</td>
<td>36%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>In bed when you wake up (weekend leisure time, before you get out of bed for work, etc.)</td>
<td>40%</td>
<td>40%</td>
<td>13%</td>
<td>7%</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>8</td>
<td>In bed before you go to sleep</td>
<td>40%</td>
<td>33%</td>
<td>20%</td>
<td>7%</td>
</tr>
<tr>
<td>9</td>
<td>In the bathroom</td>
<td>40%</td>
<td>27%</td>
<td>20%</td>
<td>13%</td>
</tr>
<tr>
<td>10</td>
<td>While exercising (running, cycling, skiing, at the gym…)</td>
<td>20%</td>
<td>13%</td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td>11</td>
<td>While you are driving, or waiting for light to turn green</td>
<td>0%</td>
<td>20%</td>
<td>40%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Table 5.6. (continued)

When asked 67% of the participants answered that they would rather meet someone face-to-face to consult something, or get an advice, 13% preferred emails, and the remaining 20% answered they would turn to text messages. Surprisingly, almost all of the participants (93%) said that they would start using smartphones if they were in a long waiting line, and only 7% would start a conversation. Another
interesting finding is that although participants seem to be using smartphones to a degree that can essentially be called excessive, according to the findings their attentions are rarely divided. Only 33% of the participants said that they sometimes mishear what people have said to them while on smartphones, 53% seldom, and 13% answered they never mishear.

Figure 5.8. Smartphone Usage during Meals

Table 5.7. Do You Feel Uncomfortable without Smartphone?

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Participants</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strongly agree</td>
<td>4</td>
<td>27%</td>
</tr>
<tr>
<td>2</td>
<td>Agree</td>
<td>7</td>
<td>47%</td>
</tr>
<tr>
<td>3</td>
<td>Disagree</td>
<td>3</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>Strongly disagree</td>
<td>1</td>
<td>7%</td>
</tr>
</tbody>
</table>
The answers to “I cannot live without my smartphone“ were exactly the same as the results shown in Table 5.7.

Forty-seven percent of the participants agreed that they *often* end up using smartphones more than they expect, 40% said *sometimes*, and 13% *seldom*. No one answered *never*.

Majority of the participants (80%) prefer meeting face-to-face to catch up with friends, and 20% says they would rather talk over Facebook, Skype, or text messaging. According to the findings, participants meet their friends, peers or family usually *once a week*. The most common place where the meetings take place is restaurants, closely followed by bars, and participants choose them based on the factors of convenience and efficiency, as well as the price and discounts.

Table 5.8. How Often Do You Go Out with Your Friends, Family or Peers?

<table>
<thead>
<tr>
<th></th>
<th>Answer</th>
<th>Participants</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Everyday</td>
<td>3</td>
<td>20%</td>
</tr>
<tr>
<td>2</td>
<td>Once every two days</td>
<td>2</td>
<td>13%</td>
</tr>
<tr>
<td>3</td>
<td>Once per week</td>
<td>10</td>
<td>67%</td>
</tr>
</tbody>
</table>
Figure 5.9. Places where Participants Usually Meet

Figure 5.10. Important Factors when Choosing a Venue
Majority of the participants (83%) say they have used Facebook Places or some other similar check-in based services. When participants were asked would they use if there was a free app that offers discounts or coupons if they do not use smartphones for a certain amount of time, 87% answered they would. Also, they said they would visit venues more for the discounts and coupons. 13% answered they would not use the app, and commented “I don't think it will help me reduce the use of smartphone.”

Figure 5.11. Venues where participants would like to receive discounts
5.3. Findings from the Validation Test

The evaluation of the study has shown positive results with a few exceptions. In order to analyze the tasks, video recordings of the participants, think aloud protocols, and verbal feedbacks were reviewed. The results of Tasks #8 and #11 are more qualitative in nature, thus they were further analyzed through fields notes from the observational study, in order to assess the participants’ behavior. Three participants (20%) failed to perform Task #5 and many found this particular task misleading, but completion rates of the other tasks were high.

Table 5.9. Overview of Task Completion

<table>
<thead>
<tr>
<th>#</th>
<th>Task</th>
<th>Expected Steps</th>
<th>Average Steps</th>
<th>Average Time</th>
<th>Completed</th>
<th>Completion rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sign up</td>
<td>2</td>
<td>2.1</td>
<td>~15 sec</td>
<td>15</td>
<td>100%</td>
</tr>
<tr>
<td>2</td>
<td>Login to “nobile”</td>
<td>2</td>
<td>2.3</td>
<td>~10 sec</td>
<td>15</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>View your profile</td>
<td>2</td>
<td>2.9</td>
<td>~9 sec</td>
<td>15</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>Edit your profile</td>
<td>1</td>
<td>2.3</td>
<td>~19 sec</td>
<td>15</td>
<td>100%</td>
</tr>
<tr>
<td>5</td>
<td>Find a friend named “Zack” and send a friend request</td>
<td>3</td>
<td>4.3</td>
<td>~25 sec</td>
<td>12</td>
<td>80%</td>
</tr>
<tr>
<td>6</td>
<td>Start a “nobile” challenge</td>
<td>3</td>
<td>3.5</td>
<td>~7 sec</td>
<td>15</td>
<td>100%</td>
</tr>
<tr>
<td>7</td>
<td>Invite your friend “Zack” to the challenge</td>
<td>3</td>
<td>3.8</td>
<td>~11 sec</td>
<td>15</td>
<td>100%</td>
</tr>
<tr>
<td>8</td>
<td>Begin the challenge and go “no+mobile” for 5 minutes</td>
<td>1</td>
<td>1.6</td>
<td>~6 min</td>
<td>15</td>
<td>100%</td>
</tr>
<tr>
<td>9</td>
<td>Finish the challenge</td>
<td>1</td>
<td>2</td>
<td>~20 sec</td>
<td>15</td>
<td>100%</td>
</tr>
<tr>
<td>10</td>
<td>Change password</td>
<td>2</td>
<td>4</td>
<td>~10 sec</td>
<td>15</td>
<td>100%</td>
</tr>
<tr>
<td>11</td>
<td>Explore the application</td>
<td>∞</td>
<td>∞</td>
<td>~2 min</td>
<td>15</td>
<td>100%</td>
</tr>
<tr>
<td>12</td>
<td>Sign out</td>
<td>2</td>
<td>2.1</td>
<td>~4 sec</td>
<td>15</td>
<td>100%</td>
</tr>
</tbody>
</table>
Task #1 and #2 (Sign up and Login to nobile)

Both tasks were very straightforward, and all participants (100%) completed them successfully without any major obstacles. Two participants (13%) clicked on Sign in when they were supposed to click Sign Up and commented “Wanted to see what happens when I click on this”. Six participants (40%) said that they would appreciate if there was a social login feature where they can use their Facebook to sign in to the application because they are always hesitant when signing up with their email. One participants suggested an anonymous login feature. Almost half of the participants (47%) wanted the application to sign them in automatically after Sign Up, instead of redirecting to the Launch screen. Also they wanted auto-capitalization on text inputs.

Task #3 (View your profile)

Completion rate was 100%. Participants searched through the home screen for visual cues, and since only items that designed as clickable were “Start a Challenge” button and the menu icon (≡), participants clicked on the latter, and found the “View Profile” link. Three participants (20%) tried clicking on the nobile logo. Five participants (33%) expressed that they would want a visual cue in the Home screen that represents the access to their profile, such as “My name or profile image”.
Task #4 (Edit your profile)

All participants (100%) successfully completed the task but there were numerous confusions. Firstly, majority of the participants found the buttons and the titles to be too similar (same color and font-size) which were the reason of many usability issues discussed further below, thus didn’t notice the *Edit Profile* button located on the bottom left immediately. Five participants (33%) clicked on the menu icon (≡) immediately to see if there was an *Edit Profile*. Two participants (13%) tried to edit their profile by tapping on the texts and said they expected that tapping would turn them into *text inputs*. After participants were on the *Edit Profile* (see Figure 3.22) screen, majority (73%) found the input texts to be too grey, and hard to read. Also, the majority (80%) expressed their frustration towards *input toggle* issue which was a bug in the prototype, meaning that text inputs were not emptying their contents when selected.

Task #5 (Find a Friend named “Zack” and send a friend request)

Three participants (20%) failed to perform the task. Expected steps were to click on the menu icon (≡) and proceed to *Find Friends* link. Instead, participants clicked on “Start a Challenge” then went on to *Invite Friends*, and were unsure of their actions. The participants who performed successfully did not face any major
obstacles but asked “How do I know if the he/she accepts my friend request?”, a feature that was not implemented in the prototype yet.

**Task #6 (Start a nobile challenge)**

Although the completion rate is 100%, the task came across as quite problematic to the participants. Firstly, the task was not elaborately explained. Secondly, once the participants clicked on *Start a Challenge* button from the home screen, it takes them to the *Check-In* screen (See Figure 3.24). The task was designed as such by the researcher in order to observe participants’ spontaneous behavior.

Three participants (20%) stated “This screen is absolutely confusing.” The title “Check-In” on the top right, and the “Continue” button located at the bottom right were major reasons of the confusion. As mentioned earlier, the button and the title design is hard to differentiate (same color and font-size), thus 87% of the participants tried clicking on the “Check-In” title instead of the “Continue” button. Also, it is found that participants didn’t understand what “Continue” button did, while “Check-In” title conveyed the intended message. Two participants commented “The discount offer shown on this screen was not noticeable. It’s too small. All I could see was one big map.”
Task #7 (Invite your friend “Zack” to the challenge)

All participants (100%) performed this task without any major obstacles. Once again, four participants (27%) asked “How do I know if he/she accepts my invite?” Two participants tried searching for their names in the search input.

Task #8 and #11 (Begin the challenge and go no+mobile for 5 minutes, and explore the application)

See 5.3.1. Qualitative Findings.

Task #9 (Finish the challenge)

Performing this task took substantially more time than anticipated. First reason is that, as participants explained, they were afraid to touch the smartphone because they were in a challenge and did not want to lose. In order to finish the challenge, the expected step was to click on the (X) icon. About a half of the participants (47%) were unsure when they clicked on this icon and confused. Apparently the icon was not a clear affordance for the intended action.

Task #10 (Change password)

All participants performed successfully. Eleven participants (73%) commented that the application is not asking the current password. Five participants
(33%) directly opened Profile screen and looked for a Change Password link. They said that they did not understand why Change Password is not in the Profile screen.

**Task #12 (Sign out)**

The completion rate for this task was 100%. Participants were not confused nor made any comments.

**5.3.1. Qualitative Findings**

This section addresses the findings from Task #8 (Begin the challenge and go no+mobile for 5 minutes), and Task #11 (Explore the application).

Thirteen out of fifteen participants (87%) did not use their smartphones during the five-minute no+mobile challenge, thus won. Two participants lost the challenge as they kept using the smartphone, mostly in order to explore the application. As anticipated, participants were very competitive during the challenge.

Five participants (40%) put their smartphones very far away from them, and two participant tried to put the smartphone in the pocket. When asked why they did so, participants replied having the smartphone close-by was tempting, and they did not want to lose because they wanted to win the $5 prize. Almost all of the participants (93%) admitted they did not want to lose.
The other half of the participants did not try to put their smartphones out of sight, but was not touching them. When the smartphones were down, all participants interacted face-to-face with the researcher and started small talk to a certain degree, circulating around general topics, asking questions about the application, and giving inputs. Three participants went over the five-minute *nobile* challenge limit, reaching 13 minutes, 9 minutes, and 7 minutes respectively. Six participants (40%) noticed and spontaneously used “Suggest a Starter” button and found it be very useful. Some their verbal feedbacks include:

“This is probably the best feature of the application.”

“Very cool!”

“A very helpful feature. But why is this almost unnoticeable?”

“I liked conversation starter thing the most.”

Four participants (27%) commented that they have noticed the button, but were scared to touch it during the challenge. Their verbal feedbacks include,

“Noticed the button, but didn’t click on it because I was scared that I might lose points.”

“I was scared to touch it.”

“Didn’t click the button because I didn’t want to lose.”

“Noticed but didn’t know what it was.”

One-third of the participants did not use the feature at all. Their responses include,

“Probably change ‘Suggest a Starter’ label. Also the button is not prominent enough.”

“It didn’t look clickable.”

“I didn’t even notice.”
5.3.1.1. Think Aloud and Debriefing

Participants were encouraged to “Think Aloud” while interacting with the prototype, and were interviewed (See Appendix F) afterwards. Their remarks were analyzed thoroughly.

All participants agreed that the application concept was easy to understand and digest, and thought the learning curve is not steep.

“I enjoyed the simplicity of the application.”

“It’s pretty easy to use.”

During the debriefing, when asked whether they felt encouraged to put their smartphones down, eight of the participants (53%) stated that they definitely felt encouraged to not use their smartphones and have face-to-face conversation. Four participants (27%) answered “A little bit encouraged” and “Sort of encouraged,” while three participants (20%) were unsure and answered “I think so”.

“Definitely felt encouraged to put the smartphone down.”

“I wasn’t encouraged in the beginning, but it got interesting.”

“Not sure about encouraging. But certainly discouraged me to touch the smartphone. Competitive.”

Participants responded that the challenge was competitive, and the discount offer motivated them. Three participants (20%) said the conversation starter button also motivated them. Participants’ verbal feedbacks include,
“I’ll use this application as long as it offers discounts.”

“I’d use only if there is some kind of offer or a prize.”

“For the discount I would use it. Who wouldn’t? It’s positive.”

“I like it but I don’t know if it’s profitable for the venue.”

All of the participants acknowledged that technology is intruding personal relationships, and agreed upon the relevance of the application in society.

“I see a lot of demand in the market.”

“I really like the purpose of the application. Get people to talk with each other.”

“Technology is intruding our lives.”

Their attitude towards the possible uses of the application in large population was somewhat divided, considering three participants (20%) wanted an additional self-challenge feature while five (33%) saw themselves using this application only with friends during social gatherings. One participant said it would be a useful workplace application, where colleagues can challenge each other during work hours. Further themes, patterns and possible uses of nobile are discussed in the Future Directions (See Section 6.3).

“This could be a great first date application.”

“Probably I won’t use it with just one person. I will need more people and discounts.”

“If the conversation starter feature is good enough, I’ll use it”
Two participants (13%) thought they would not use this application for more than 30 minutes.

“The challenge might get boring after, say 10 minutes. Add more interesting things.”

“Personally I don’t use smartphones that much, so I don’t really see much use of this.”

None of the participants made negative comment towards the color, typography, and visual design of the application, but their remarks towards the ease of use was varied but generally positive as discussed earlier. Participants seemed particularly attracted to the name nobile. One participant stated “A smart name!”.

When asked, thirteen out of fifteen participants (83%) answered the application could possibly help people to reduce the use smartphone and help people to converse.
5.3.2. Results from the Post-Questionnaire

The result of the post-questionnaire based on The System Usability Scale (Brooke, 1996) is presented below.

Table 5.10. System Usability Scale Results

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overall, I am satisfied with how easy it is to use this product.</td>
<td>4.2</td>
</tr>
<tr>
<td>2</td>
<td>It was simple to use this product.</td>
<td>4.13</td>
</tr>
<tr>
<td>3</td>
<td>I feel comfortable using this product.</td>
<td>4.13</td>
</tr>
<tr>
<td>4</td>
<td>It was easy to learn to use this product.</td>
<td>4.2</td>
</tr>
<tr>
<td>5</td>
<td>The product gives error messages that clearly tell me how to fix problems</td>
<td>3.53</td>
</tr>
<tr>
<td>6</td>
<td>Whenever I make a mistake, I was able to recover easily and quickly</td>
<td>3.87</td>
</tr>
<tr>
<td>7</td>
<td>It is easy to find the information I needed</td>
<td>3.87</td>
</tr>
<tr>
<td>8</td>
<td>It has all the functions and capabilities I expect it to have</td>
<td>3.53</td>
</tr>
<tr>
<td>9</td>
<td>The information provided for the product made it easy to understand</td>
<td>3.93</td>
</tr>
<tr>
<td>10</td>
<td>The interface design of this product is pleasant</td>
<td>4.47</td>
</tr>
<tr>
<td>11</td>
<td>I like using the interface of this product.</td>
<td>4.47</td>
</tr>
<tr>
<td>12</td>
<td>I would recommend this product to others</td>
<td>4.4</td>
</tr>
<tr>
<td>13</td>
<td>Overall, I am satisfied with this product.</td>
<td>4.2</td>
</tr>
</tbody>
</table>
### Table 5.11. System Usability Scale Results #2

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
<th>Q5</th>
<th>Q6</th>
<th>Q7</th>
<th>Q8</th>
<th>Q9</th>
<th>Q10</th>
<th>Q11</th>
<th>Q12</th>
<th>Q13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min Value</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Max Value</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Mean</td>
<td>4.2</td>
<td>4.13</td>
<td>4.13</td>
<td>4.2</td>
<td>3.53</td>
<td>3.87</td>
<td>3.87</td>
<td>3.53</td>
<td>3.93</td>
<td>4.47</td>
<td>4.47</td>
<td>4.4</td>
<td>4.2</td>
</tr>
<tr>
<td>Variance</td>
<td>0.46</td>
<td>0.55</td>
<td>0.41</td>
<td>0.6</td>
<td>0.55</td>
<td>1.12</td>
<td>1.12</td>
<td>0.84</td>
<td>0.64</td>
<td>0.41</td>
<td>0.41</td>
<td>0.4</td>
<td>0.46</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.68</td>
<td>0.74</td>
<td>0.64</td>
<td>0.77</td>
<td>0.74</td>
<td>1.06</td>
<td>1.06</td>
<td>0.92</td>
<td>0.8</td>
<td>0.64</td>
<td>0.64</td>
<td>0.63</td>
<td>0.68</td>
</tr>
<tr>
<td>Total Responses</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

### Table 5.12. System Usability Scale Results #3

<table>
<thead>
<tr>
<th>#</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>13</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>
5.4. Discussion

The application proposed in this research study, nobile, was designed to enable users to have face-to-face interaction and reduce excessive use of smartphones by challenging each other not to use smartphones during social gatherings by offering discount prizes. It is to be expected that nobile use will positively impact users’ social behavior.

Research Question 1: Do users excessively utilize smartphones?

All participants (100%) were smartphone users with a frequency of use ranging from less than 2 hours to over 6 hours on an average day. The results show that 87% of the participants spent more time using smartphones than they expected to, and 74% feel uncomfortable without smartphones. At least 14 hours of any given week is typically spent by an individual using a smartphone. Smartphones allow connection to a large group of people and, for the scope of this study, the average size of the group is approximately 150 or more. Seventy-four percent of the participants agree that they cannot live without their smartphones.

Given these results, it seems certain that a majority of people between the ages of 18 and 29 use and utilize smartphones regularly or to a degree that can be considered excessive. Interestingly enough, while they are using smartphones, participants’ attention is seldom divided between the smartphone and the face-to-
face conversation, or at least participants think this is true. The sample size of the study was selected with a primary intention of evaluating whether the nobile user interface provides an effortless experience; some of the smartphone usage results thus might differ slightly for a larger population of smartphone users.

**Research Question 2:** Does the nobile user interface provide an effortless experience?

This study was aimed at evaluating the nobile user interface as to whether or not it provides an effortless user experience. Considering the handicaps that participants were never exposed to the interface design, were not given any time to explore and become familiar with the application, and were provided either very little or no assistance during the study, the results were positive. Participants performed 100% on all tasks except Task #5 (Find a Friend named “Zack” and send a friend request) in which three participants (20%) failed. None of the participants were lost or confused to the degree that they needed to skip a task. The post-questionnaire, based on a System Usability Scale, showed positive results, with the lowest mean being at 3.53/5 with respect to “The product gives error messages that clearly tell me how to fix problems,” and the highest mean at 4.47/5 with respect to “The interface design of this product is pleasant” and “I like using the interface of this product,” respectively. Participants said the learning curve of the application was not steep, and they enjoyed its simplicity. This translates into a determination
that the *nobile* user interface can be effectively used when distributed to large population. Although task completion rates were high, there were numerous unpredicted usability issues, notably with respect to the Check-In screen as discussed earlier (see Figure 3.24 & Task #5 results), and design iterations were needed to fix certain issues.

**Research Question 3:** Does *nobile* incentivize non-usage of smartphones in social situations?

As a persuasive technology application, the foremost goal of *nobile* application is to have positive effects on its users by decreasing their smartphone usage and increasing face-to-face interactions and conversations. Results show that it had a positive impact on participants, since they felt motivated, initiated face-to-face interactions and conversations during the simulated *nobile* challenge, and reduced their smartphone usage. Eight of the participants (53%) stated that they definitely felt encouraged to avoid use of their smartphones and have more face-to-face conversation. Four participants (27%) answered “A little bit encouraged” to “Sort of encouraged” and three participants (20%) were unsure and answered “I think so”. However, all of the participants agreed that the application was relevant, that the challenge was competitive, and that the discount offer motivated them. Three participants (20%) said the conversation starter button also motivated them.
As predicted, the discount offer proved to be the major motivational factor of the application. Social influence was also somewhat important in motivating participants, but not as crucial as was anticipated. Three participants (20%) wanted an additional self-challenge feature while five (33%) saw themselves using this application only with friends during social gatherings. The remaining participants generally agreed that the nobile challenge would be more fun with friends. One participant commented “I want to start a conversation but with a stranger it feels weird.”

The results have shown that nobile successfully incentivized non-usage of smartphones for the majority of the participants, but further research remains regarding motivations and incentives. Social situations were artificial; results and measures might differ in natural environments and with a group of actual friends.

**Research Question 4:** Do users feel persuaded to change their social behavior and converse with the aid of nobile?

The nobile application’s ultimate success depends on whether participants initiated face-to-face interaction or conversations during the challenge. During the study, when the smartphones were down because of the nobile application, all participants (100%) initiated small talk to a certain degree, with topics ranging from
general, to asking questions about the application, to giving inputs in order to simply pass the challenge time; participants and the researcher thus interacted face-to-face. Three participants (20%) went over the five-minute noible challenge limit, reaching 13 minutes, 9 minutes, and 7 minutes, respectively. When asked, thirteen out of fifteen participants (83%) indicated that the application could possibly help people to reduce the use of their smartphones and encourage regular conversation. People felt persuaded and changed their social behavior for a certain amount of time. Ninety-three percent of participants admitted they did not want to lose; thus they changed their behavior. It is concluded that noible is effective in facilitating face-to-face conversations.

Research Question 5: Can noible be used as a platform for conducting research studies with respect to social interactions?

Even though there were some limitations in the study, it represented a pilot methodology for evaluating applications and platforms like noible. The methodology worked in spite of its shortcomings. It was proven that the noible application is a nearly perfect venue for conducting research and can be used by other researchers as a platform for commissioning future studies concerning social interactions, social norms, and rules.
CHAPTER 6. CONCLUSIONS

6.1. Overview

Communication technology is more portable than ever, and modern society is increasingly connected and technology-enabled. These technologies have allowed people to communicate in never-before-imagined ways. How people communicate and even their basic manner of living is being shaped by technology. People seem to somewhat unfortunately be immersed in smartphones, with minds clouded by the illusion of digital companionship, not interacting with others, and unaware of the potential negative consequences that might result from the lack of social interaction and technology dependency. As Baym (2010) explains, “After millennia spent as creatures who engage in social interaction face to face, the ability to communicate across distance at very high speeds disrupts social understandings that are burned deep into our collective conscience.” (p. 3)

This research study presents a persuasive technology application called nobile designed to positively change human social behavior. The application enables users to engage in face-to-face interaction and reduce excessive use of smartphones by challenging one another through discount prize rewards to put down their smartphones during social gatherings while also suggesting enthralling conversation starters. A working version of the
application was designed, developed, and evaluated. A total of 15 participants between the ages of 18 and 29 were recruited via email and word of mouth. Participants accepted the challenge of putting down their smartphones for five minutes under control of the *nobile* application so the researcher could observe their behavior and evaluate whether people were feeling motivated to put smartphones down and converse with others face-to-face. Participants’ interactions with the application user interface as well as their voice output were recorded using a smartphone screen-recording software package called REC. To prevent the identification of the participants, no facial images were captured. Participants additionally completed questionnaires both before and immediately after the study and were interviewed regarding their experience with the prototype.

Even though there were limitations in the study, it provided a pilot methodology for evaluation of applications and platforms like *nobile*, and it has been proven that the application itself can be used by other researchers as a platform for conducting research studies concerning social interactions, social norms, and rules.

The study results show that people between the ages of 18 and 29 use smartphones regularly and in some cases to a degree that can be considered excessive. Participants found the application learning curve to be easy and
successfully interacted with the interface without major confusion in completing the assigned tasks. The results also demonstrated that participants felt encouraged to put their smartphones down. All participants initiated face-to-face conversation once their smartphones were put down. They commented that the application is very relevant and the concept is intriguing. Discount offers proved to be a powerful motivational factor of the application; social influence was not, however, as important as expected. The initial study results show that *nobile* is effective at facilitating face-to-face interactions and conversation. The impact *nobile* had on small talk is noteworthy, because face-to-face conversation and small talk is probably the most information-rich means of communication and the fundamental way of nurturing and sustaining relationships and creating bonding (Nardi & Whittaker, 2002). *nobile* has social implications and can be a proof concept for further research with respect to how people interact with mobile technology.

It was also proven that *nobile* can be used in various different contexts ranging from workplace to self-challenge to social situations. Thus, applications like *nobile* that advocate positive behavioral changes by encouraging smartphone users to take breaks from their smartphones to engage in meaningful conversations during social gatherings can have
widespread beneficial impact on modern society, and should also be marketable.

6.2. Study Limitations

The main limitations of this study were the small sample size of 15 participants, the male-dominated majority, and the artificial context of the study sessions.

The collected data concerning usage of smartphones, as well as the qualitative measures could have been more specific and accurate if there had been a higher number of participants. Additional participant variables that could have been addressed include education, occupation, economic background, and ability to access technology.

For each usability study session, the social situation was artificial and the number of people involved in the nobile challenge was two: the participant and the researcher. If the study sessions had been conducted in natural environments and social situation among groups of people who knew each other well, preferably friends, and without the researcher’s direct involvement, the qualitative findings regarding social interactions and face-to-face conversations might have been more intriguing and authentic, and the
importance of the social influence could have been more accurately measured and observed.

6.3. Future Directions

The very first step of future work, based on the data collected from the study, should be to perform another interface design iteration to correct major usability issues (see Table 6.1). This would include redesigning the Check-In screen and implementing new functionalities, including badges and timeline, followed by a re-test. The assumption is that, after another iteration, the application user interface should be more appealing and intuitive when distributed to a larger population of smartphone users.

Table 6.1. Major Usability Issues

<table>
<thead>
<tr>
<th>#</th>
<th>Issue</th>
<th>Fix</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visual similarities of buttons and titles designs.</td>
<td>Differentiating font size and color, and making buttons look more clickable.</td>
</tr>
<tr>
<td>2</td>
<td>Inputs not auto capitalizing</td>
<td>Debugging the application</td>
</tr>
<tr>
<td>3</td>
<td>Inputs not clearing default value on focus</td>
<td>Debugging the application</td>
</tr>
<tr>
<td>4</td>
<td>Inputs’ content too grey and hard to read</td>
<td>Make the input content color brighter</td>
</tr>
<tr>
<td>5</td>
<td>Check In screen</td>
<td>A complete redesign. Differentiating title and button, making the map smaller and the discount offer more prominent.</td>
</tr>
<tr>
<td>6</td>
<td>Finish challenge icon</td>
<td>Using a text “Finish” instead of an icon.</td>
</tr>
<tr>
<td>7</td>
<td>“Suggest a Starter” button</td>
<td>Change the title to “Conversation Starter” and make it more clickable.</td>
</tr>
</tbody>
</table>
Second, we should create a *nobile* movement to raise awareness of the potential negative outcomes resulting from lack of social interaction and face-to-face conversation. Such a movement would be based on commonly used social media channels, specifically Instagram and Facebook. The basic premise is “If you see that a smartphone is disrupting communication between people, take a picture and share it with the hashtag: #benobile.” The movement would have another purpose in addition to raising awareness, i.e., marketing to give *nobile* more public exposure and attract more users. Gaining exposure and additional users could directly translate into more face-to-face interaction and meaningful conversations, ultimately leading to a widespread beneficial impact on society.

Third, although this research study revolved around excessive smartphone use as a detractor to face-to-face conversation among people, the additional aspects of family life and dynamics were not addressed. I am interested in doing further research with respect to how smartphones affect family life and family dynamics when members are equipped with smartphones.

Last, but not least, the application presented in this research study, *nobile*, is the very first of various possible persuasive applications, all designed with the purpose of positively changing human behavior and encouraging people to put their smartphones down. Potential future design and development variations include,
• *nobile Drive*, an application designed to reduce distracted driving, encouraging people to drive without looking at the smartphones,

• *nobile Education*, designed to encourage students not to use smartphone during classes or when they are studying,

• *nobile Workplace*, allows colleagues to challenge each other to not use smartphones during working hours,

• *nobile Self Challenge* where one can initiate a self-challenge to not use smartphones,

• *nobile Sleep*, designed to challenge people to go to sleep without fidgeting with their smartphones.

Moreover, further developing the “Suggest a Starter” feature, and designing an application for facilitating small talk is also a possibility. I would like to do further research regarding all these variations and concepts because they have potential to be implemented, distributed, and used.

The biggest lesson learned (or more accurately, re-learned) from the research study was the importance of teamwork. Iteratively designing, prototyping, and developing a native Android application, as well as designing a usability test to assess the application, pilot a methodology, conduct the study, moderate the study sessions, analyze the data, and write a report in just a few months was an overwhelming process. It was certainly more than a one-person effort. Therefore, in
future research and development phases, I plan to involve more people, work as part of a team, and thereby move forward together faster and better toward social change and betterment.
REFERENCES


APPENDIX A. PRE-QUESTIONNAIRE

1. What is your age?
   - □ 18-21
   - □ 22-25
   - □ 26-30
   - □ 31-40
   - □ 40+

2. What is your gender?
   - □ Male
   - □ Female

3. What is your location?
   - □ Asia
   - □ Africa
   - □ North America
   - □ South America
   - □ Europe
   - □ Australia

4. What is the highest level of education you have completed?
   - □ High school or GED
   - □ Associate degree
   - □ Bachelor’s degree
   - □ Master’s degree
   - □ Doctorate
   - □ Others (Please specify: __________)

5. Do you use or own a smartphone as your primary mobile phone?
   - □ Yes
   - □ No

6. Which of the following smartphone type do you currently use?
   - □ iPhone
   - □ Android
7. How many applications have you downloaded to your smartphone?
   - 1-5
   - 5-10
   - 10-15
   - 15-20
   - 20+

8. How much time do you spend on smartphones on average daily?
   - Less than 2 hours
   - 2 hours to 4 hours
   - 4 hours to 6 hours
   - 6 hours or above

9. Which of the following social networks do you use? (check all applied)
   - Facebook
   - Twitter
   - Instagram
   - Tumblr
   - LinkedIn
   - Google Plus
   - Snapchat
   - Vine
   - YouTube
   - Reddit
   - Pinterest
   - Myspace

10. How much time do you spend on social networks on average daily?
    - Less than 1 hour
    - 1 hours to 2 hours
    - 2 hours to 4 hours
    - 4 hours or above

11. How many friends/followers do you have on Facebook, or other social networking websites?
12. To what degree do you use your smartphone for the following activities?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social networking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checking and sending email</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading news and contents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web browsing and searching</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text messaging</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getting directions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Playing games</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing finances and bills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Listening to music</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watching videos</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13. Excluding voice calls, how often do you use your smartphone in these situations?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Often</th>
<th>Sometimes</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idle time at work or school (during breaks, lunch, boring meetings/classes, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riding the bus, train, or in car as passenger (commute)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waiting in line (examples: coffee shop, grocery store, for movie to start, picking up kids, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
14. Excluding voice calls, do you find yourself using your smartphone when you’re in social situations such as catching up with friends, family or peers?

- Often
- Sometimes
- Seldom
- Never

15. Excluding voice calls, when you need to consult something with someone, or get an advice, which of the following would you prefer?

- Meet face-to-face
- An email
- Text messages (Facebook message, text message, etc)

16. You are in a long line waiting. Which of the following would you do?

- Talk to the person next to me
- Start using my smartphone
- Nothing

17. I mishear what people have said to me because I was using my smartphone.

- Often
- Sometimes
18. I use smartphone while I am having meals.

❑ Often
❑ Sometimes
❑ Seldom
❑ Never

19. I feel uncomfortable when I am without my smartphone.

❑ Strongly agree
❑ Agree
❑ Disagree
❑ Strongly disagree

20. I feel there is social stress when I use my smartphones. For example, messages, emails, Facebook notifications bother me sometimes.

❑ Strongly agree
❑ Agree
❑ Disagree
❑ Strongly disagree

21. I feel there is social stress when I am not using my smartphones. For example, the urge to have conversation with someone bothers me sometimes.

❑ Strongly agree
❑ Agree
❑ Disagree
❑ Strongly disagree

22. I usually spend more time than I expect on smartphones.

❑ Often
❑ Sometimes
❑ Seldom
❑ Never

23. I can’t live without my smartphone.

❑ Strongly agree
❑ Agree
24. Do you feel that you are using your smartphone a lot?
   - Yes
   - No

25. Have you ever tried to use your smartphone less?
   - Yes
   - No

26. Do you think that you will strive to use your smartphone less in future?
   - Yes
   - No

26. Which one would you prefer?
   - Catching up via Facebook, Skype, text messaging, etc.
   - Catching up at some place, face-to-face

27. How often do you go out with your friends, family or peers?
   - Everyday
   - Once every two days
   - Once per week
   - Once per month
   - Less frequently than the above

28. Where do you usually meet?
   - Restaurant
   - Fast food
   - Club
   - Bar
   - Café / Lounge
   - Snack bar
   - Coffee shop
   - Others (Please specify)

29. Which of the following is the most important factor when you choose a venue (place to sit and catch up)?
Convenience and efficiency
Price / Discount
Credit and branding
Healthiness
Superior enjoyment

30. Have you ever used the following location-based service applications?

Facebook Places (Check-in)
Foursquare
Groupon
Google Places
Yelp

31. If there is a free app that offers instant discount or coupons on your bill only if you don't use your phone for a certain amount of time, would you use it?

Yes
No

31.1. Why wouldn't you use it?

Please specify:

32. What kind of venues you would like to receive their discounts and coupons through the app?

Restaurant
Fast food
Club
Bar
Café / Lounge
Snack bar
Coffee shop
Others (Please specify)

33. If the venue offered discounts or coupons when I don’t use your phone, I would visit more.

Strongly agree
Agree
Disagree
Strongly disagree
## APPENDIX B. POST-QUESTIONNAIRE

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th></th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overall, I am satisfied with how easy it is to use this product.</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>2</td>
<td>It was simple to use this product.</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>3</td>
<td>I feel comfortable using this product.</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>4</td>
<td>It was easy to learn to use this product.</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>5</td>
<td>The product gives error messages that clearly tell me how to fix problems</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>6</td>
<td>Whenever I make a mistake using the product, I was able to recover easily and quickly</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>7</td>
<td>It is easy to find the information I needed</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>8</td>
<td>It has all the functions and capabilities I expect it to have</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>9</td>
<td>The information provided for the product is easy to understand</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>10</td>
<td>The interface design of this product is pleasant</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>11</td>
<td>I like using the interface of this product.</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>12</td>
<td>I would recommend this product to others</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
<tr>
<td>13</td>
<td>Overall, I am satisfied with this product.</td>
<td>strongly disagree</td>
<td></td>
<td></td>
<td></td>
<td>strongly agree</td>
</tr>
</tbody>
</table>
APPENDIX C. INFORMED CONSENT FORM

Title of Study: nobile: Design and evaluation of a persuasive technology application for social behavior change
Research Team: Principle Investigator: Zack Batsaikhan
Faculty Supervisor: Ana-Paula Correia, Ph.D

This is a usability study on an interface. Please take your time in deciding if you would like to participate. Please feel free to ask questions at any time. No personal or financial information will be collected during the session.

INTRODUCTION
The purpose of this study is to evaluate an interface designed to encourages people to have face-to-face interactions and reduce excessive use of smartphones by challenging users to not use them.

This usability study will help to develop a more usable product for general public.

Participants will not get direct benefits other than reflect on their own use of mobile devices. However, this knowledge can be expected to ultimately provide significant opportunities to improve usability of interface system for general public. At the same time, it is expected that this study contributes to generalizable knowledge which will be used to help the society and its people to have meaningful interpersonal communication, instead of sitting with their phones, give full attention to each other, empathize with each other, live life to the fullest, and be less clouded by the illusion of digital companionship.

DESCRIPTION OF PROCEDURES
If you agree to participate in this study, your participation will last for approximately 60 minutes.

During the study you may expect the following study procedures to be followed.

1. The participants will complete a pre-survey questionnaire regarding demographic information, their usage of mobile devices and the Internet.
2. The participants will perform a series of tasks on a mobile application interface using an Android device.
3. The participants will "think aloud" (explain their actions as they perform them) and their interaction (tap, swipe and other gestures) with the interface and voice will
be recorded using a usability software, although participants face will never be recorded.
4. The data collected from this study will be analyzed both quantitatively (number of clicks required to complete tasks, number of error, etc.) and qualitatively (user verbal feedback while working on the task) in order to evaluate the interface. Names of the respondents will be identified as pseudonyms.
5. The participants will be asked to complete a brief survey on their experience with the interface.
6. The participants will be asked a few brief interview questions concerning if they felt encouraged to interact face-to-face with others.

RISKS
There are no foreseeable risks in this study. However, you may leave the study at any time without penalty.

BENEFITS
Participants will not get direct benefits other than reflect on their own use of mobile devices. However, this knowledge can be expected to ultimately provide significant opportunities to increase face-to-face interactions.

COSTS AND COMPENSATION
If you agree to partake in this study you will receive $5 cash as compensation.

PARTICIPANT RIGHTS
Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. If you decide to not participate in the study or leave the study early, it will not result in any penalty or loss of benefits to which you are otherwise entitled. During the testing, if you feel uncomfortable at anytime you can quit.

CONFIDENTIALITY
Records identifying participants will be kept confidential to the extent permitted by applicable laws and regulations and will not be made publicly available. However, federal government regulatory agencies and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information.

To ensure confidentiality to the extent permitted by law, the following measures will be taken.

The participant’s identity will be anonymous all throughout the study. Only the researchers will have access to the data. The data will be entered and kept in a
password-protected database located on the researchers’ computers. All data files will be destroyed once entered in the computer for analysis.

QUESTIONS OR PROBLEMS
You are encouraged to ask questions at any time during this study. For further information about the study contact Ana-Paula Correia, Supervisor, email acorreia@iastate.edu, or Zack Batsaikhan, Principal Investigator, batzayab@iastate.edu

If you have any questions about the rights of research subjects or research-related injury, please contact IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, Office for Responsible Research, (515) 294-3115, 1138 Pearson Hall, Ames, IA 50011.

SUBJECT SIGNATURE
Your signature indicates that you voluntarily agree to participate in this study, that the study has been explained to you, that you have been given the time to read the document and that your questions have been satisfactorily answered. You will receive a copy of the signed and dated written informed consent prior to your participation in the study.

Subject’s Name (printed) ____________________________________________

Subject’s Signature ___________________________ Date ________________
Imagine you’re at Starbucks with a friend. Remember that Starbucks is offering 10% discount to the “nobile” challenge winner.

1. Sign up
2. Login to “nobile”
3. View your profile
4. Edit your profile
5. Find a friend named “Zack” and send a friend request
6. Start a “nobile” challenge
7. Invite your friend “Zack” to the challenge
8. Begin the challenge and go “no+mobile” for 5 minutes
   (Imagine you’ve received an email, and several Facebook notifications during the challenge. You’re encouraged to check them.)
9. Finish the challenge
10. Change password
11. Explore the application
12. Sign out
APPENDIX E. EMAIL SCRIPT FOR RECRUITING PARTICIPANTS

Dear [name],

We are looking for participants for a usability study on “nobile,” an application designed to facilitate face-to-face interaction by challenging people to put their smartphones down.

We are testing the interface to improve its usability by video recording your interaction with the interface on iOS or Android devices. The usability study will take about 60 minutes at the UX Lab, 2629 Howe Hall.

The usability study will be scheduled at a time that is convenient to you. In the video recording of your interaction with the interface your face will not be shown.

Participation is completely voluntary. All of the information participants provide will be kept strictly confidential and reported in summary form only. No individual will be identified, nor will participants’ names be attached to any data. At the end of the project, researchers will destroy any identifying personal information.

Would you be willing to spend approximately 60 minutes participating in a usability study of an interface? Participants will receive $5 cash as compensation.

If you are older than 18 years old and willing to participate in this study, please reply saying “Yes.” We will email you an informed consent document for you to review and set up a convenient time for the testing session. The informed consent form will be provided at the test site for your signature.

Again, you may choose to withdraw from participating at any time without penalty.

If you have any questions or concerns, feel free to contact us at any time.

Zack Batsaikhan at batzayab@iastate.edu
Ana-Paula Correia at acorreia@iastate.edu

Thank you for your time and consideration.
APPENDIX F. INTERVIEW QUESTIONS

Was the product concept simple enough to comprehend? Was it easy to understand how it works?

Did you feel encouraged to socialize and interact face-to-face while during the no mobile challenge?

Do you think you can reduce your use of smartphones using this product?

What did you appreciate the most about using this product?

What did you find the most frustrating using this product?

Would you use this product in your everyday life/job?

Do you think it is important to have a product like this?

What is your anticipation for this product’s future development?

Do you have any addition questions or comments?