

Cell Phone Dependence and Socialization:

Digital Devices and their Impact on Undergraduate Communication and Behavior

Camille Phaneuf

University of Michigan, Ann Arbor

Acknowledgements:

Daniel Kruger: Mentor

Department of Psychology, University of Michigan, Ann Arbor

Submission:

March 31st, 2019

A thesis submitted in partial fulfillment of the Degree of Bachelor of Science in Cognitive

Science with Honors

Abstract

Research in Cyberpsychology suggests that cell phone usage has pervaded daily life in the United States, and the lives of university undergraduates in particular, since the advent of widespread accessibility to smartphones. The existing literature points to an increasing human dependence on personal cell phones, but it has yet to be concluded whether or not cell phone dependence can be classified as an addiction. The current study uses multiple methods to inform knowledge in this area, combining a controlled experiment with a quasi-naturalistic observation, self-report survey, and focus group discussion. The survey includes measures of Fear of Missing Out (FoMO), ring anxiety, phantom calls or messages, cell phone use dependence, and self-reported usage. The research questions include: a) whether or not addictive behavior related to cell phone use is apparent, b) whether or not there are gender differences in cell phone behaviors, c) the influence that presence vs. absence of cell phones has on spontaneous social interactions, and d) whether survey measures related to cell phone use and dependency predict cell phone related behaviors.

Keywords: observational research, survey research, cell phone, cell phone dependency, phantom ringing, Fear of Missing Out (FoMO)

Table of Contents

Abstract	i
Scientific Acknowledgements	iv
Personal Acknowledgements	v
Introduction	2
Excessive Internet Use and Outcomes	2
Excessive Social Media Use and Outcomes	3
Specific Indicators of Cell Phone Dependency: <i>Social Outcomes</i>	4
Specific Indicators of Cell Phone Dependency: <i>Phantom Experiences</i>	5
Specific Indicators of Cell Phone Dependency: <i>Cell Phone Latency</i>	5
Consequences of Cell Phone Dependency	6
Hypotheses	6
Importance of Studying Cell Phone Dependency	7
Method	9
Participants	9
Materials	10
Procedure	10
Data Analysis	12
Quality Assurance	13
Results	14
Quasi-Naturalistic Observations	14
Surveys	14
Focus Group Discussion	16

Multi-Modal Results	16
Discussion	17
Consideration of Hypotheses	17
Strengths	18
Limitations	19
Future Directions	20
Implications	22
References	23

Scientific Acknowledgments

- I. Dora Juhasz for her assistance with data collection and entry, quality assurance, and project management.
- II. In alphabetical order, Research Assistants Bushra Hassan, Alyssa Moore, Nathan Schooner, and Jessica Tung for their assistance with data collection and entry.
- III. The University of Michigan's Psychology Department Subject Pool, for participant recruitment.
- IV. The Weinberg Institute for Cognitive Science, for supporting conference travel to the Midwestern Psychological Association 2018 Meeting and International Convention for Psychological Science 2019.
- V. The LSA Honors Program, for supporting conference travel to Michigan Academy for Science, Arts, and Letters 2017 Conference, Midwestern Psychological Association 2018 Meeting, and International Convention for Psychological Science 2019.

Personal Acknowledgements

A special thanks to my mentor, Dr. Kruger, for his support and encouragement over the course of my undergraduate career. I could not have imagined a more productive and exciting foray into the world of psychological research, and as a result of this thesis, feel empowered to pursue a graduate degree using rigorous, multi-modal methodology like that employed here. I must also extend a warm thank-you to Dora Juhasz, for being not only a wonderful collaborator on this project, but an even better friend.

Cognitive Science Honors Thesis

Introduction

Since the invention of the first prototype mobile phone with personal digital assistant features in the early 1990s, smartphones have come to pervade daily life in the United States. In fact, by November 2015, 68% of all adults in the United States owned a cell phone; this proportion can be broken down into 86% of people aged 18 to 29 and 83% of people aged 30 to 49 (Weise, 2015). The younger age group corresponds to a generation that has largely “grown up” with mobile technology, never experiencing life without the convenience of cell phones and personal computers. As a result, cell phone ownership in general, and smartphone ownership in particular, has become the norm. Certainly, social implications of widespread usage of such devices have manifested themselves, even over a relatively short period of time.

Excessive Internet Usage and Outcomes

Several studies on cell phone dependency have been conducted in recent years, though there is a greater amount of literature that addresses excessive internet usage. Internet usage deserves attention when discussing the motivations for the current study because cell phone functionality, and that of smartphones in particular, is inextricably tied to the internet. To elaborate on an instance of such a past study, Xavier, Marta, Montserrat, Ander, & Ursula (2008) claim that internet usage itself can be addictive, and that overuse can lead to “the development and maintenance of other addictions” that are facilitated by an online server. Importantly, the authors also argue that “maladaptive use of mobile phones may be considered abuse, but not addiction,” as their use does not promote the same type of rapid emotional changes that are seen with internet addiction. After all, as is the standard with the Diagnostic and Statistical Manual of Mental Disorders DSM-5), only clinically significant behaviors can be considered for the strict

label of ‘addiction’; otherwise, the behavior must be referred to in lighter terminology. However, since smartphones have obtained increasing capabilities in the eleven years since Xavier and colleagues published in 2008, their results may have become outdated. Therefore, the current study aims to reopen the issue of cell phone addiction (especially in terms of its impact on social anxieties and non-virtual communication).

The population of interest for the current study is university undergraduate students in the United States, as college students are particularly vulnerable to internet addiction due to: a) psychological and developmental characteristics, b) their easy access to the internet, and c) the necessity of (often) abundant internet use for the completion of university coursework (Kandell, 1998). Accordingly, the current study intended to investigate whether or not the same predispositions to internet addiction in undergraduates apply to cell phone dependency.

Excessive Social Media Usage and Outcomes

In addition to internet usage, recent research efforts have investigated excessive social media use as well. As a popular example, engaging with Facebook has predicted declines in subjective well-being in young adults (Kross et al., 2013). While social media appears to bring individuals from around the world together, connecting them in ways that were infeasible before widespread internet access, populations with relatively barrier-free connectivity are perhaps subject to worse life satisfaction than they were before participating in social media outlets. Despite the finding that interpersonal conversations are typically related to greater reports of daily happiness, virtual interactions might not produce the same positive effects (Kross et al., 2013; Kahneman & Krueger, 2006). It is important to study social media use in the context of cell phones because these devices make such platforms so readily accessible. If too much communication occurs via virtual platforms, society should be concerned about potential impacts

on happiness (especially in the aforementioned, young adult populations), and should more critically consider the hardware that is making the digital connections possible.

Specific Indicators of Cell Phone Dependency: *Social Outcomes*

Smartphones are an easy, popular, and robust portal for the internet and social media outlets. Therefore, the literature discussed above is highly relevant to the current project. Additionally, and perhaps even more interestingly, there have been a number of studies that suggest cell phone dependency -- as a potential precursor to abuse or addiction *and* as a concept in its own right -- in the population of interest.

In general, it is known that cell phones are often used in social situations to avoid communication with others (Sapacz, Rockman, & Clark, 2016) and that the over-usage of cell phones has been a cause for issues within romantic relationships (Roberts & David, 2016). More specifically, it has been shown that cell phone use is socially contagious. That is, in an observational study, individuals were significantly more likely to use their cell phones when their partner-in-conversation used their cell phone first (Finkel & Kruger, 2012). Gender differences were also reported; female pairs used their phones more frequently (32% of the time) than male pairs (25% of the time) or mixed pairs (22% of the time) (Finkel & Kruger, 2012). Additionally, attachment style has been shown to be related to phantom cell phone experiences, which are the imagined sensations of a cell phone ringing or vibrating, when in fact no notification has been delivered to the device (Kruger & Djerf, 2016). In particular, attachment anxiety (which is characterized by worries regarding abandonment by a partner and the lack of reciprocal feelings by a partner) is a direct predictor of the frequency of such experiences (Kruger & Djerf, 2016). There are even further social implications, because contextual factors (like expectations for or

concerns about a certain notification) also predict phantom cell phone experiences (Kruger & Djerf, 2016).

Specific Indicators of Cell Phone Dependency: *Phantom Experiences*

In another report, Kruger & Djerf (2017) found that the frequency of phantom cell phone experiences was strongly predicted by self-reported cell phone dependency symptoms, and that higher amounts of cell phone dependency were reported by: a) women, b) younger individuals, and c) participants with lower emotional stability and conscientiousness. The combination of Kruger & Djerf (2016) and Kruger & Djerf (2017) show that phantom experiences, via cell phones, are not only linked to attachment style as a correlate of socialization, but cell phone dependency as well. Therefore, this literature provides strong motivations for the current study, which aims to inform the field of Cyberpsychology in regard to the impact that cell phones might have on interpersonal social behaviors.

Specific Indicators of Cell Phone Dependency: *Cell Phone Latency*

Lastly, a cell phone latency study was previously conducted in order to discern the amount of time it takes an individual to use their cell phone upon entering a waiting space; the author contributed to this project and was inspired by the following results when designing the present investigation. In an observational study of primarily undergraduate students waiting in line at coffee shops, fast casual restaurants, and campus bus stations, it was reported that 62% of subjects used their phones in line (32% upon arrival, 30% after arrival), and that of the subjects who used their phones, 80% did so within the first twenty seconds of entering the waiting space (Kruger et al., 2017).

As an interim summary, the culmination of the findings stated in the sub-headings above provides a strong body of evidence for the emergence of cell phone dependencies in the population of interest, thus warranting the current project.

Consequences of Cell Phone Dependency

Aside from the obvious inefficiencies in the classroom or workplace that internet and cell phone overuse can incite amongst college students (e.g. frequent distractibility), there are also a number of serious psychological, health, and behavioral correlates associated with these technological abuses, which have perhaps more important implications. For instance, it has been shown that pathological cell phone use is affiliated with both insomnia and high anxiety (Jenaro, Flores, Gómez-Vela, González-Gil, & Caballo, 2007). The current study needed to be conducted in order to determine whether or not cases of cell phone dependency are saturating society, and the undergraduate population in particular. To review, the existing body of literature regarding the social outcomes of internet, social media, and cell phone use, in addition to evidence of phantom experiences and abrupt cell phone latencies, will be re-addressed in the current project in context with each other, to inform a more complete understanding of cell phone usage in the present generation.

Hypotheses

It is hypothesized that cell phone dependency among undergraduate students will become apparent throughout this study, which will have serious social consequences. Namely, the data collected will suggest that:

- I. Undergraduate students experience numerous social anxieties, including the Fear of Missing Out (FoMO), which are facilitated by social media sites, since they are popularly accessible via cell phones.

- II. Women are more likely to be dependent on their cell phones than men, given the results reported by the Finkel & Kruger (2012) contagious cell phone use study and the Kruger & Djerf (2017) phantom cell phone experience study, both described above.
- III. The lack of cell phones in an unfamiliar waiting space increases social anxiety by emphasizing the absence of a digital distraction, thus driving participants to be more likely to initiate and engage in conversation.
- IV. The non-virtual communication skills of current undergraduate students are diminishing when in the presence of digital communication methods, thus participants are predicted to initiate and engage in conversation less while in a waiting space with their cell phones.
- V. The cell phone latency results reported by Kruger et al. (2017) are corroborated by quasi-naturalistic observation methods. Furthermore, participants will self-report greater cell phone latency times than those actually observed.

Importance of Studying Cell Phone Dependency

It is worth noting that it was long debated whether addictions should be carved into behavioral and substance-related disorders (see Frascella, Potenza, Brown, & Childress [2010] for a review). However, the DSM-5 included a number of revisions (see American Psychiatric Association [2013] for the specific revisions described here) that are highly relevant to the current study, including the formalization of the division between behavioral and substance-related disorders. First, substance abuse and dependence were combined into a single disorder, measured on a continuum from mild to severe. Second, gambling disorder was moved into a new category of behavioral addictions, reflecting the similar clinical expression, brain origin,

comorbidity, physiology, and treatment as substance-related disorders. Additionally, though internet gaming disorder was not considered to be diagnosable at print, it was noted and posed a request for further research. These changes relate to cell phone dependency because they confirm that: a) it is meaningful to identify overuse as a potential disorder, regardless of severity, and b) behavioral addictions have clinical validity.

To elaborate, substance use disorders in the DSM-5 are significant and diagnosable wherein an individual meets two or more of the following criteria within an 12-month period: engaging in hazardous use, having social and/or interpersonal problems related to use, neglecting major roles in order to use, having withdrawal, demonstrating tolerance, using larger amounts and/or using for longer, repeatedly attempting to quit and/or control use, spending much time using, having physical and/or psychological problems related to use, giving up activities in order to use, and craving (Hasin et al., 2013). Since the DSM-5 only includes disorders that are deemed clinically significant, this thesis will be careful to avoid diagnosing participants with cell phone addiction, though the project may establish a basis for dependency. Even if the lack of cell phone access produces withdrawal symptoms (for example), the disorder still might not be clinically significant; importantly, this thesis does not intend to resolve this ambiguity. Rather, as described in the **Method** section, the current study will address symptoms regarding social and interpersonal problems, time spent using, and psychological problems as its primary focus in an attempt to further characterize cell phone dependency within the subset of behavioral (not substance-related) disorders.

If incidences of addiction are indeed present and the social consequences hypothesized above are in fact supported, then measures should be taken to address the psychological, health, and behavioral correlates of cell phone abuse. It is concerning that such a potentially detrimental

profile of cell phone dependency has the ability to permeate the lives of so many young individuals. Already, addiction has been shown to manifest itself among secondary school adolescents (a particularly at-risk group), as demonstrated by cell phone use in socially inappropriate or dangerous situations (e.g. texting while driving), the adverse effects cell phones can have on relationships, and the presence of functional or behavioral impairments as a result of excessive cell phone usage (Nikhita et al., 2015). Furthermore, access to cell phones is occurring within increasingly younger populations. These individuals are more at-risk for cell phone dependency for a variety of reasons, including (but not limited to) the complex developmental trajectory of cognitive control and the enhanced salience of potential rewards, which can lead to riskier choices that may impede goal-oriented behavior (Somerville & Casey, 2010). To put these findings in context, an adolescent with access to a smartphone containing social media applications may be more sensitive to the ‘reward’ of followers or likes on such applications, which may occupy more of their attention and allocate time away from the accomplishment of regular but important academic, professional, and extracurricular goals. Since these consequences would carry serious implications for the futures of the described adolescents, effortful intervention must be taken if a scientific basis for addiction is established.

Method

The University of Michigan’s Institutional Review Board for Health Sciences and Behavioral Sciences reviewed this project prior to data collection.

Participants

The participants ($N = 353$) for this study were recruited from the Psychology Subject Pool at the University of Michigan, via an alphanumeric code. As our focus population was undergraduate students, the Psychology Subject Pool represented the appropriate demographic.

Students ranged in academic year, including freshman (61%), sophomores (27%), juniors (6%), seniors (2%), and seniors+ (1%), and there were 38% male and 62% female subjects. No participants withdrew from the study, there were no exclusionary criteria, and all participants were compensated with course credit.

Materials

The materials for this study included a video camera and tripod (which documented each half-hour session), a circle of chairs for participants, letter cards on the desks (in order to identify subjects during subsequent coding), and paper copies of the surveys (see Appendix D). A diagram of a prototypical study room is also included in Appendix A.

Procedure

This study was a combination of multiple research techniques. Namely, in order to achieve a well-rounded approach to answering the question at hand, a controlled experiment with: (A) quasi-naturalistic observations, (B) a self-report survey, and (C) a focus group discussion were conducted. The video camera was turned on before participants arrived at the testing location in order to record the entirety of the session. Participants were triaged as they arrived (in groups of four to six) and directed to read the provided consent forms outside of the designated room. Once all of the participants arrived, they were instructed to enter the study room simultaneously. At this point in the study, the experimental variable was implemented; that is, groups were randomly assigned to one of the following two conditions:

1. *Cell Phone*, in which participants were given no explicit instructions restricting usage of their cell phones.
2. *No Cell Phone*, in which participants' cell phones were confiscated upon entering the study room.

(A) Quasi-Naturalistic Observations

The participants were directed to proceed to the Controlled Waiting Space (CWS), which contained a circle of chairs and tables facing inward in an effort to facilitate conversation. In the No Cell Phone condition, a box containing the participants' cell phones was placed in the middle of the tables. The participants were instructed to sit down, and were told:

"I need to go grab the correct survey, I accidentally printed off the wrong one. Please wait here for the study to begin; this should not take me more than five minutes."

The experimenter then left the room for five minutes. Meanwhile, the participants were recorded by the video camera, and their interactions (including comments, actions, etc.) were later encoded using the criteria illustrated in Figure 1.

(B) Self-Report Survey

After the experimenter returned with the surveys, subjects were given five to ten minutes to complete them. The questions investigated participant demographics, opinions regarding cell phone etiquette, instances of FoMO, reports of phantom vibrations, and anxiety experiences during cell phone deprivation. As mentioned above, a copy of the survey questions is included in Appendix D for reference.

(C) Focus Group Discussion

Once everyone finished their surveys, the experimenter pretended to turn on the camera and notified the participants with an explanatory comment similar to:

"We are just going to record your responses to this discussion so that our research team can review them later."

Then, the experimenter joined the participants in the circle and guided an approximately five minute long focus group discussion regarding cell phone etiquette. The questions were as follows:

1. When is it NOT appropriate to use a cell phone?
2. Do you ever experience FoMO? In what context?
3. Do you ever experience phantom vibrations? When do you feel the phenomena?
4. (Only for groups that were not permitted to keep their cell phones) Did you feel anxious without your cell phone?
5. Would you consider yourself addicted to your cell phone?

The video footage of these interactions was transcribed at a later date, then processed by two independent research assistants (RAs) using a custom command line utility, named `CommandLineClassifier`; additional details regarding the functionality of this application can be found in Appendix B. The transcriptions were tagged (0 = NO, 1 = YES, 2 = UNCLEAR) according to the forthcoming prompts, which match the numbering system listed above:

1. Does this answer demonstrate awareness of cell phone etiquette?
2. Does this answer demonstrate FoMO?
3. Does this answer demonstrate phantom vibrations?
4. Does this answer demonstrate anxiety from the absence of a cell phone?
5. Does this answer demonstrate extreme cell phone dependency and/or addiction?

Finally, subjects were given a debriefing document to inform them of the purpose of the study. Participants were permitted to leave the study room once they had finished reading the document.

Data Analysis

No individual subjects were excluded from analysis, but video recordings of sessions were not considered if:

1. Participant(s) arrived late to the CWS, knocking on the door and/or entering the testing room. Such an intrusion sparks conversation amongst the seated participants, and thus violates the fabricated quasi-naturalistic environment.
2. Participant(s) solved the ethical deception (further discussed in **Limitations**). In other words, they recognized that their interpersonal and cell phone behaviors were being recorded while in the CWS, which again violates the assumptions of the quasi-naturalistic environment.
3. There were experimenter or technological errors during the session.

After the data was cleaned according to above stipulations (graphically displayed in Appendix C), they were analyzed using an R script, written by the author. From the survey component, the motivational, emotional, and behavioral correlates of FoMO were calculated according to Przybylski, Murayama, DeHaan, & Gladwell (2013). Additionally, phantom vibrations, notifications, and ringing were assessed in the same way as Kruger & Djerf (2016). Lastly, cell phone use dependence was calculated according to the six-item questionnaire cited in Kruger & Djerf (2017), which was a subset of the original Mobile Phone Problem Use Scale (Bianchi & Phillips, 2005).

Quality Assurance

Given the multi-modal nature of this study, extra precautions were taken so as to confirm the quality of the data being used in analysis. Firstly, all transcriptions were completed and subsequently reviewed by a second RA; meaningful differences in interpretations of the participants' answers were resolved between the RAs. Secondly, the tagging of these

transcriptions was completed by a team of two independent RAs using the CommandLineClassifier, who worked together after operating the program to resolve any discrepancies; again, more information about the CommandLineClassifier can be found in Appendix B. Thirdly, coding of the quasi-naturalistic behaviors was also completed by a team of two RAs working together, thus ensuring precise timing and corroborating the interpretation of behaviors. Lastly, every aspect of each session was reviewed by two RAs working independently, in order to determine whether a session qualified as ‘complete’ for the purposes of multi-modal data evaluation (for more information, see Appendix C); conflicts were resolved by the author.

Results

As predicted, data collected from individuals ($N = 353$) over the course of 73 study sessions exhibited the prevalence of cell phone dependency amongst undergraduate students. For clarity, each aspect of the methodology has its own section below, and multi-modal results are discussed last.

Quasi-Naturalistic Observations ($N = 232$)

As seen in Table 1 and Figure 2, the majority of participants in the Cell Phone group engaged in use ($M = 0.75$, $Med = 1.00$), and their latencies (though more dramatic) generally corroborate the results reported previously by Kruger et al. (2017) and presently by self-report surveys ($M = 21$ seconds, $Std = 37$ seconds, $Min = 0.0$ seconds, $Q1 = 2.5$ seconds, $Med = 8.0$ seconds, $Q3 = 20.0$ seconds, $Max = 175.0$ seconds). A complete set of the quasi-naturalistic results can be found in Table 1.

Surveys ($N = 353$)

Revisitation of Earlier Studies

Participants showed evidence of FoMO ($M = 2.50$, $Std = 0.65$), which corresponds to an average FoMO endorsement of 'Slightly true' to 'Moderately true'. In terms of phantom cell phone experiences (ringing, vibrations, and/or notifications), 15.86% of participants reported no phantom experiences, 34.28% of participants reported 1 phantom experience, 31.44% of participants reported 2 phantom experiences, and 18.41% of participants reported all 3 types of phantom experiences. To break down each type of experience individually, 28.33% of participants reported phantom ringing, 70.82% of participants reported phantom vibrations, and 53.26% of participants reported phantom notifications. Overall, the mean number of phantom experience endorsements was 1.52 ($Std = 0.97$). Participants also showed evidence of cell phone use dependence ($M = 4.12$, $Std = 1.12$), which corresponds to an average cell phone use dependence endorsement of 'Neither agree nor disagree' to 'Agree a little'. Lastly, the self-reported cell phone use latencies are shown in Figure 3. As mentioned above, the self-reported latencies tend to match those collected with other measures; 50% of participants report using their phones within 30 seconds of entering a waiting space (21.31% within 10 seconds, 28.29% within 11-30 seconds).

Open-Ended Questions

The results of the open-ended questions are summarized in Table 2, including both self-reported descriptives of cell phone use and gender differences in these reports.

Intergroup Discomfort Levels

There were not significant differences reported for the Cell Phone vs. No Cell Phone groups.

Gender Differences

In addition to the gender differences show in Table 2, females report higher levels of FoMO ($p < .05$) and cell phone use dependence ($p < .05$) than males, but females and males report similar amounts of phantom cell phone experiences. Females also report greater lengths of cell phone latency than males ($p < .005$).

Focus Group Discussions ($N = 314$)

Qualitative

A number of participant comments demonstrated the pervasiveness of cell phone use in daily undergraduate life, and even suggested a self-awareness of addictive tendencies. Some of these comments include: “Everyone that has a cell phone is somewhat addicted to it” and “It’s literally everything in one device, so it’s hard to not be addicted to it I guess.”

Quantitative

The quantitative focus group discussion results, obtained with the CommandLineClassifier, as summarized in Table 3.

Multi-Modal Results ($N = 165$)

The multi-modal results (as selected combinations of the three methodologies discussed above), are as follows. Firstly, cell phone latencies observed and self-reported within each individual participant were not significantly different. Self-reported latencies were quantified as the lower bound of each of categorical answer choice for choices 1-5 (see Appendix D, Question 29), and a paired t-test was conducted (95% CI: [-19.46, 0.59]). Next, 65% of participants endorsed feelings of FoMO in the focus group discussions, while 100% of participants self-reported feeling an average of ‘Slightly true’ FoMO or stronger in their surveys. Thirdly, 70% of participants endorsed phantom experiences (ringing, vibrations, and/or notifications) in the focus group discussions, while 84% of participants self-reported phantom experiences in their surveys.

Lastly, 17% of participants endorsed feeling anxious without their cell phones for the duration of the study, while the average self-reported comfort level corresponded to ‘Slightly Comfortable’ on the survey (see Appendix D, Question 43).

Discussion

Consideration of Hypotheses

The multi-modal methodology employed in the current study allowed for a comprehensive investigation of the proposed hypotheses. Conclusions reached for each hypothesis are described in detail below:

- I. Undergraduate students show evidence of numerous social anxieties, including moderate to high levels of FoMO (moderate amounts of FoMO were seen in the survey data, while higher levels of FoMO were seen in the focus group discussions). In addition to these methodological modalities, social anxiety was also demonstrated by the lack of cell phone access driving more frequent, earlier initiating, and longer lasting interpersonal conversation in a CWS (see Table 1).
- II. Female participants, overall, self-reported more dependent cell phone behaviors than male participants (see Figure 4). Though not all proxies for cell phone dependency yielded gender differences, five did, and four of those five showed differences in the same direction. Potential explanations for the one outlier are offered in Figure 4.
- III. The No Cell Phone groups were more likely to initiate and engage in conversation in the CWS. Without their cell phones as a digital distraction, participants appeared to more strongly feel the social pressure to communicate interpersonally as compared to their Cell Phone group counterparts, who frequently used their phones to avoid live conversation. However, explicit differences in discomfort levels were not reported by the two groups.

- IV. The non-virtual communication tendencies of current undergraduate students are diminishing dramatically when digital communication methods are available, as seen most dramatically in Table 1. Whether or not this behavioral change is maladaptive remains unclear. If undergraduates are just as (or even more) social when in the presence of their cell phones, but over virtual platforms instead of in live conversation, then there might not be cause for concern with the way in which cell phones have come to pervade the lives of such students. However, if cell phones, and the platforms which they support, are impeding live social interactions without offering a strong alternative, then interventions should be considered to resolve this impediment and protect the interpersonal social behaviors of undergraduates.
- V. The cell phone latency results reported by Kruger et al. (2017) were corroborated by quasi-naturalistic observation methods. Additionally, participants tended to self-report greater cell phone latency times than those actually observed. To elaborate, 50% of participants observed had cell phone use latencies of 8 seconds or less, while 50% of participants self-reported cell phone use latencies of 30 seconds or less. The differences in results between these two methodologies could be attributed to a potential lack of self-awareness or self-reflectiveness regarding the nuances of personal cell phone use.

Strengths

This study includes a number of strengths; namely, the presence of three types of approaches. First, the subjects were observed in naturalistic, unobtrusive way while they were waiting for the experimenter to return with their surveys. These types of observations are rare in current psychological research (as technology has allowed surveys to become such a convenient and efficient mass data collection technique), yet they carry tremendous value. Unlike studies

involving a planned intervention, observational data is minimally influenced by methodology. Secondly, the same subjects all participated in a controlled experiment, which included a dichotomously manipulated variable; either no cell phones were allowed *or* no explicit statement was made about the permissible use of cell phones during the study. Finally, all of the subjects completed a survey which assessed their social media habits, the presence of FoMO, their use of cell phones in waiting spaces, and the existence of phantom vibrations, in an effort to establish whether or not the participants were dependent on their cell phones. These converging methods increase confidence in the results obtained, because there are three sub-studies all pointing toward the same conclusion. For instance, linking observational data to survey data co-strengthens the evidence.

This study is also sound because it revisits earlier work. Namely, the project re-addresses an investigation of cell phone latency (Kruger et al., 2017) and phantom vibrations (Kruger & Djerf, 2017). The data collected in the converging methods of this experiment support the previous findings, thus affirming these particular aspects of cell phone dependency, and inspire further confidence that, in general, cell phone addiction may be at play.

Limitations

It is important to note that this study had its limitations. Although naturalistic observations produce data directly of behavior, the fact that the participants were from the subject pool means that they could be familiar with, and primed to look for, “deception” that occurs during psychological studies. Additionally, they arrived at a known psychological experiment, thus the environment could be considered artificial.

Another limitation is that some subjects previously knew each other, which eases conversation initiation, and thus skews the data in favor of the null hypothesis; namely, that

millennial sociability is not in decline. Unfortunately, these preexisting relationships could not be controlled for during subject recruitment, though less than 9% of participants claimed to know another individual in their session prior to the start of the study, so the impact of these relationships should be minimal.

Additionally, the participant sample may not be representative of University of Michigan students (as the subject pool is mostly comprised of first- and second-year students enrolled in Psychology 111 and Psychology 112), and the undergraduate population of the United States in general. As the University of Michigan has selective admittance guidelines (for instance, less than 29% of applicants were granted admission in 2016 when this study began), the students at this institution have different academic profiles from undergraduates at other colleges (in terms of standardized testing, the middle 50% range for entering students' composite ACT scores was 30-34 in 2016, while the state of Michigan average was 20.3) (Student Profile, 2016; Average ACT Scores by State, 2016). It is speculated that another notable trait about the University of Michigan's undergraduate population is its level of affluence, due in part to the large out-of-state population that pay significantly higher tuition rates (the 2016 freshman class included 3,298 non-resident students out of a total of 6,689 enrollees) (Freshman Profile, 2017). Since students and their families are generally considered to be wealthier than average, the results found may not generalize to the rest of the United States' undergraduate population. Finally, while the University is making strides to promote racial and ethnic diversity, UM demographics are not typical for every college, and therefore are not applicable in every region or on every campus (see Freshman Profile [2017] for reference).

Future Directions

It is important to replicate this study in both younger and older populations in order to determine whether or not cell phone dependent behaviors vary by generation. In particular, it would be valuable to note whether the live communication tendencies of individuals older than undergraduate students are also reduced when in the presence of digital communication methods, and whether or not these additional populations experience social anxieties similar to undergraduates, as facilitated by the various social media platforms provided on smartphones. It would also be interesting to investigate whether or not younger individuals, who often have earlier access to cell phones than the population included in the current study, show even more dramatic differences in virtual vs. non-virtual communication in a CWS than those reported here.

The launch of an fMRI study to explore cell phone dependency would also be informative. Vulnerability markers for various classical consumptive addictions, like heavy alcohol use, have been identified, and include particular neurocognitive performance and neural response patterns during inhibition, working memory, and reward processing (Squeglia & Gray, 2016). To assess whether cell phone dependency elicits similar regions of interest as classical addictions or other behavioral addictions (as reported with excessive gaming in Ding et al. [2014]), participants could, for example, undergo the go/no-go task (to measure inhibition) or monetary incentive delay task (to measure reward processing) in the fMRI scanner. They would be divided into dependent and non-dependent groups (as determined by a self-report survey similar to the one employed in the current study), and potential differences in neural patterning could be discovered. Such an experimental design is valid given the strong neurobiological link already demonstrated between behavioral addictions and substance use disorders, and expanding this knowledge base will only improve prevention and treatment strategies for both categories of disorders (see Grant, Brewer, & Potenza [2006] for a complete argument).

Lastly, a study that employs the experience sampling method would be useful for better understanding the types of activities that undergraduates engage with on their cell phones. As introduced previously in **Consideration of Hypotheses**, if undergraduates are engaging in primarily high-quality social interactions on their cell phones, then concern might not need to be raised over the lack of live conversation when digital devices are present. By probing undergraduate cell phone behavior throughout their day, we can offer insights into this area.

Implications

Cell phone dependency in undergraduates is strongly suggested by the results of this study. Furthermore, undergraduates' non-virtual communication skills appear to be diminishing when an alternate (virtual) method of socializing and/or entertainment presents itself. Since such dependencies can cause inefficiencies in the classroom or workplace, psychological problems, and the decline of particular social skills (which are integral to our identity as human beings), it is necessary to use the evidence provided throughout this thesis, and in future work, as a vehicle for change in cell phone behaviors at the personal, and perhaps even at the institutional, level.

References

- American Psychiatric Association DSM-5 Fact Sheets. (2013). *Substance-Related and Addictive Disorders*. Retrieved from <https://www.psychiatry.org/psychiatrists/practice/dsm/educational-resources/dsm-5-fact-sheets>
- Average ACT Scores by State. (2016). *ACT Inc.* [Data file]. Retrieved from <https://www.act.org/content/dam/act/unsecured/documents/CCCR-2016-Average-Scores-by-State.pdf>
- Ding, W. N., Sun, J. H., Sun, Y. W., Chen, X., Zhou, Y., Zhuang, Z. G., Li, L., Zhang, Y., Xu, J. R., & Du, Y. S. (2014). Trait impulsivity and impaired prefrontal impulse inhibition function in adolescents with internet gaming addiction revealed by a Go/No-Go fMRI study. *Behavioral and Brain Functions, 10*(1), 20.
- Frascella, J., Potenza, M. N., Brown, L. L., & Childress, A. R. (2010). Shared brain vulnerabilities open the way for nonsubstance addictions: carving addiction at a new joint?. *Annals of the New York Academy of Sciences, 1187*(1), 294-315.
- Hasin, D. S., O'Brien, C. P., Auriacombe, M., Borges, G., Bucholz, K., Budney, A., Compton, W. M., Crowley, T., Ling, W., Petry, N. M., Schuckit, M., ... Grant, B. F. (2013). DSM-5 criteria for substance use disorders: recommendations and rationale. *The American journal of psychiatry, 170*(8), 834-51.
- Jenaro, C., Flores, N., Gómez-Vela, M., González-Gil, F., & Caballo, C. (2007). Problematic internet and cell-phone use: Psychological, behavioral, and health correlates. *Addiction research & theory, 15*(3), 309-320.
- Finkel, J.A. & Kruger, D. J. (2012). Is cell phone use socially contagious?. *Human Ethology Bulletin, 27*, 15-17.
- Grant, J. E., Brewer, J. A., & Potenza, M. N. (2006). The neurobiology of substance and

- behavioral addictions. *CNS spectrums*, *11*(12), 924-930.
- Kahneman, D., & Krueger, A. B. (2006). Developments in the measurement of subjective well-being. *Journal of Economic Perspectives*, *20*(1), 3-24.
- Kandell, J. J. (1998). Internet addiction on campus: The vulnerability of college students. *CyberPsychology & Behavior*, *1*(1), 11-17.
- Kruger, D. J., & Djerf, J. M. (2016). High ringxiety: Attachment anxiety predicts experiences of phantom cell phone ringing. *Cyberpsychology, Behavior, and Social Networking*, *19*(1), 56-59.
- Kruger, D.J., & Djerf, J.M. (2017). Bad vibrations? Cell phone dependency predicts phantom communication experiences. *Computers in Human Behavior*, *70*, 360-364.
- Kruger, D. J., Duan, A., Juhasz, D., Phaneuf, C. V., Sreenivasa, V., Saunders, C. M., ... & Misevich, S. L. (2017). Cell Phone Use Latency in a Midwestern USA University Population. *Journal of Technology in Behavioral Science*, *2*(1), 56-59.
- Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., ... & Ybarra, O. (2013). Facebook use predicts declines in subjective well-being in young adults. *PloS one*, *8*(8), e69841.
- Nikhita, C. S., Jadhav, P. R., & Ajinkya, S. A. (2015). Prevalence of mobile phone dependence in secondary school adolescents. *Journal of clinical and diagnostic research: JCDR*, *9*(11), VC06.
- Przybylski, A. K., Murayama, K., DeHaan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior*, *29*(4), 1841-1848.
- Roberts, J. A., & David, M. E. (2016). My life has become a major distraction from my cell phone:

- Partner phubbing and relationship satisfaction among romantic partners. *Computers in Human Behavior*, *54*, 134-141.
- Sapacz, M., Rockman, G., & Clark, J. (2016). Are we addicted to our cell phones?. *Computers in Human Behavior*, *57*, 153-159.
- Somerville, L. H., & Casey, B. J. (2010). Developmental neurobiology of cognitive control and motivational systems. *Current opinion in neurobiology*, *20*(2), 236-241.
- Squeglia, L. M., & Gray, K. M. (2016). Alcohol and drug use and the developing brain. *Current psychiatry reports*, *18*(5), 46.
- Student Profile. (2016). Retrieved from <https://admissions.umich.edu/apply/freshmen-applicants/student-profile>
- Weise, U. E. (2015). Smartphones reaching saturation among Millennials. Retrieved from <http://www.usatoday.com/story/tech/2015/10/29/smartphones-saturation-millennials-pew-research/74805506/>
- Xavier, S. C., Marta, B., Montserrat, C., Ander, C., & Ursula, O. (2008). Internet and cell phone addiction: passing fad or disorder?. *Adicciones*, *20*(2).

Figure 1. Encoding for quasi-naturalistic observations. The items listed were all included in the initial study design. However, during data processing it was noted that in the No Cell Phone condition, it was too difficult to consistently and accurately identify: a) when a participant glances at the cell phone box, and b) when a participant reaches into their pocket for their (non-present) cell phone. Therefore, these measures were not recorded in later sessions, and thus were not included in analysis.

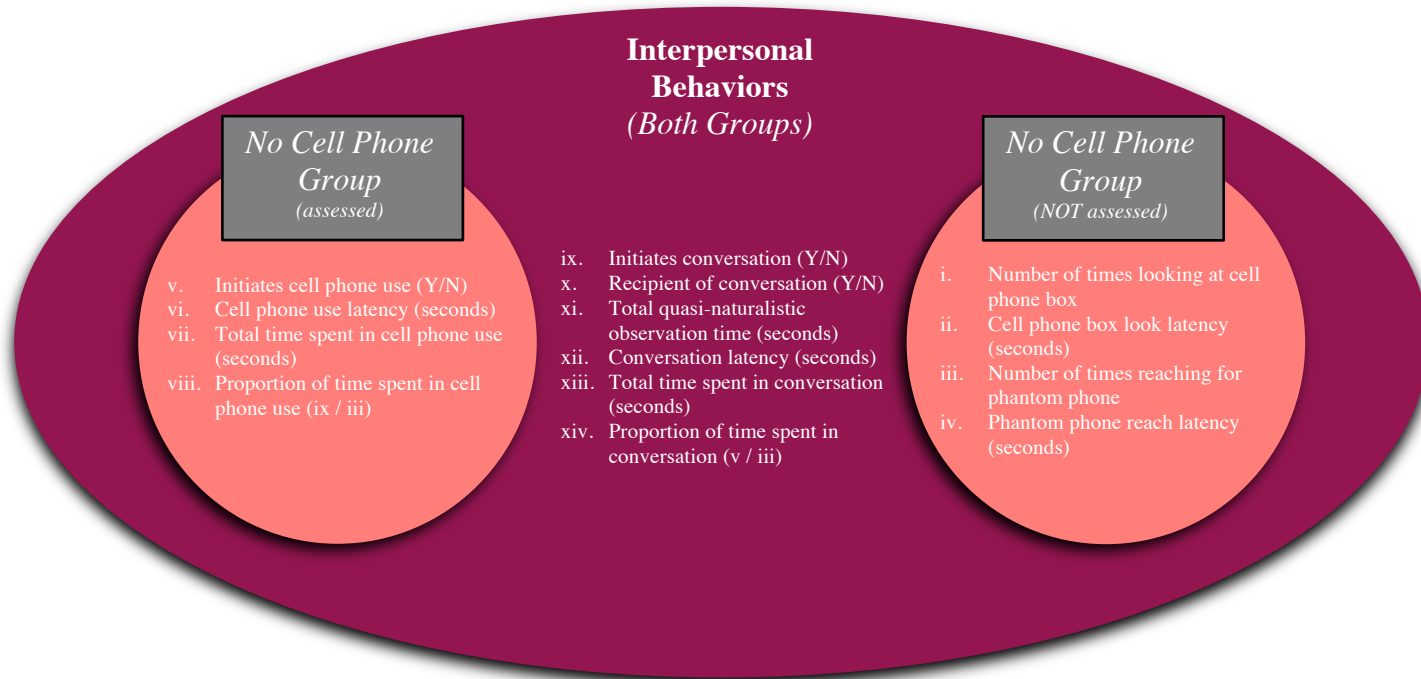


Figure 2. Boxplot for the quasi-naturalistic cell phone use latencies observed in the Cell Phone condition (in seconds; $N = 87$). Participants that did not use their phones were excluded from this analysis. The 80th percentile latency discussed by Kruger et al. (2017) is shown in green, and the highlighted latency ranges reported in the survey data are shown in coral.

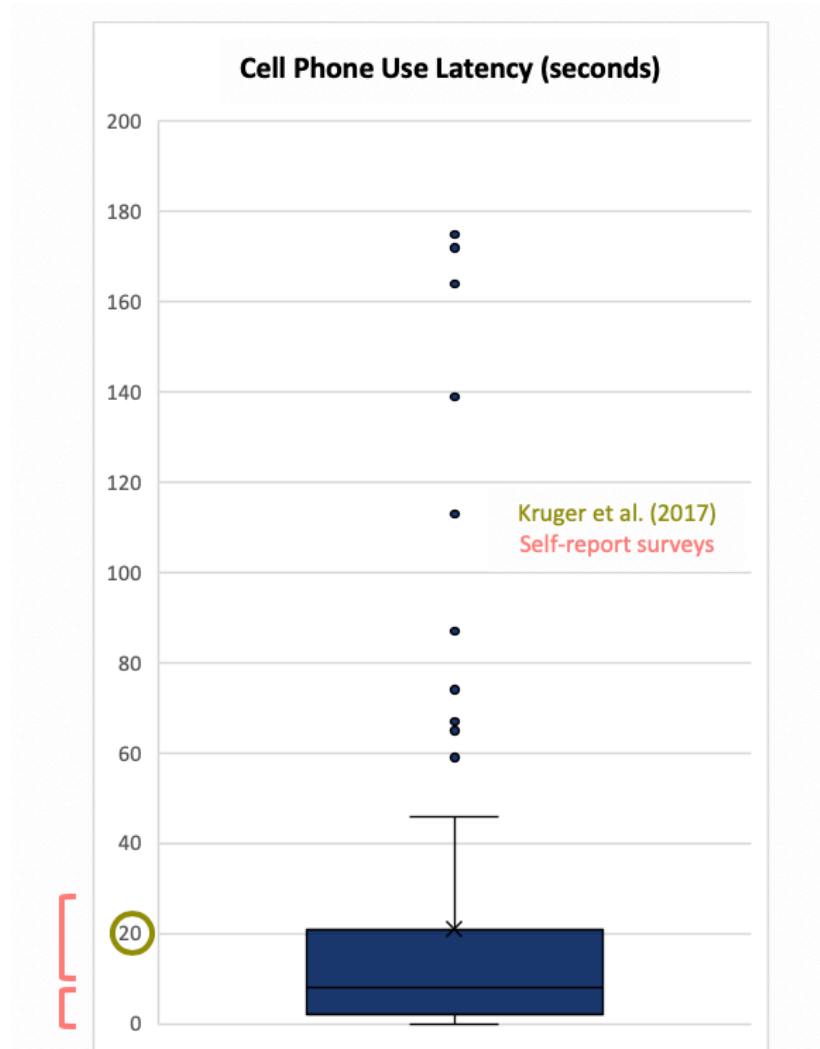


Figure 3. Bar graph for the cell phone use latencies self-reported in the survey (in seconds; $N = 352$). The bar corresponding to the 80th percentile latency discussed by Kruger et al. (2017) is shown in green, and the slice corresponding to the 3rd quartile latency observed in the CWS is shown in navy.

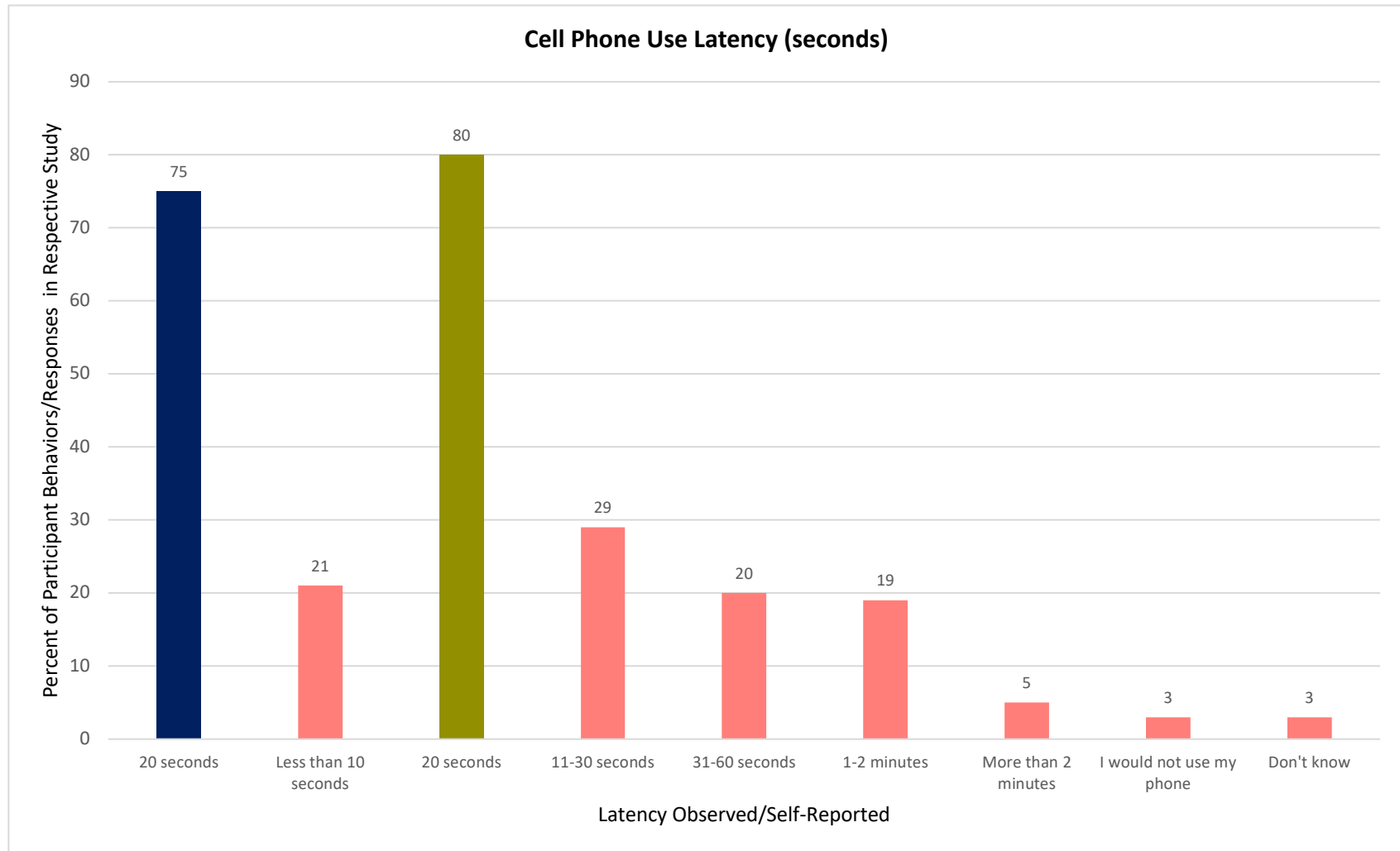


Figure 4. Gender differences (and the lack thereof) self-reported in the surveys. Interestingly, females self-report greater lengths of cell phone latency than males, though in many other areas, females tend to show strong indications of cell phone dependency. We would expect to find consistent gender differences, though the deviation seen here might not in fact be a difference in cell phone dependency, but a difference in self-reflection or self-awareness of cell phone use latency. Further naturalistic or quasi-naturalistic observational studies should be conducted in order to assess gender differences in a perhaps less participant-biased, and thus more accurate, manner.



Table 1. Data Collected from Quasi-Naturalistic Observations

	Cell Phone Group (N = 116)	No Cell Phone Group (N = 116)	Intergroup Comparison
Engagement in Live Conversation	52% of participants	78% percent of participants	$t(232) = 4.26,$ $p < .001,$ $d = .56$
Conversation Latency	$M = 74$ seconds	$M = 42$ seconds	$t(232) = -2.96,$ $p = .004,$ $d = .47$
Proportion of Time in Conversation	27% of total time	58% of total time	$t(232) = 6.93,$ $p < .001,$ $d = .91$
Engagement in Cell Phone Use	75% of participants		
Cell Phone Use Latency	$M = 21$ seconds		
Proportion of Time in Cell Phone Use	53% of total time		

Table 2. Descriptive Data Collected from Surveys

	Mean	Standard Deviation	5 Number Summary	Gender Differences
Number of Minutes on Phone	159.80	296.95	<i>Min</i> = 2 <i>Q1</i> = 60 <i>Med</i> = 120 <i>Q3</i> = 180 <i>Max</i> = 4000	$M_{females} = 2.75$ $M_{males} = 2.39$ $p < .005$ Females self-report being on their phones significantly more minutes than males.
Number of Times 'Checking' Phone	55.96	88.64	<i>Min</i> = 0 <i>Q1</i> = 20 <i>Med</i> = 30 <i>Q3</i> = 60 <i>Max</i> = 1000	$M_{females} = 2.47$ $M_{males} = 1.74$ $p < .005$ Females self-report checking their phones significantly more frequently than males.
Number of People in Contact with	10.21	9.89	<i>Min</i> = 0 <i>Q1</i> = 5 <i>Med</i> = 8 <i>Q3</i> = 12 <i>Max</i> = 100	$M_{females} = 2.11$ $M_{males} = 1.81$ $p = .133$ Females and males do not self-report significant differences in the number of people that they are in contact with.
Number of Calls Made	2.19	2.34	<i>Min</i> = 0 <i>Q1</i> = 1 <i>Med</i> = 2 <i>Q3</i> = 3 <i>Max</i> = 20	
Number of Calls Received	2.00	1.82	<i>Min</i> = 0 <i>Q1</i> = 1 <i>Med</i> = 2 <i>Q3</i> = 3 <i>Max</i> = 15	
Number of Texts Sent	69.15	83.68	<i>Min</i> = 0 <i>Q1</i> = 20 <i>Med</i> = 50 <i>Q3</i> = 100 <i>Max</i> = 600	

Number of Texts Received	87.67	114.41	<i>Min</i> = 0 <i>Q1</i> = 20 <i>Med</i> = 50 <i>Q3</i> = 100 <i>Max</i> = 1000
---------------------------------	-------	--------	---

Note: Participants that responded with non-numeric answers (e.g. ‘unlimited’ or ‘every X minutes’) were not included in the above counts. 0.28% of participants responded in such a way for Texts Sent, 0.28% of participants responded in such a way for Texts Received, 1.70% of participants responded in such a way for Minutes on Phone, and 3.97% of participants responded in such a way for Times ‘Checking’ Phone.

Table 3. Quantitative Data Collected from Focus Group Discussions

	Proportion Endorsed
Fear of Missing Out (<i>N</i> = 249)	0.747
Phantom Experiences (<i>N</i> = 270)	0.793
General Addiction (<i>N</i> = 123)	0.114
Lack of Cell Phone-Inducing Anxiety (<i>N</i> = 268)	0.646

Note: The proportions reported are those from the respondents (*Ns* indicated in each row); they do not reflect the proportions from the total number of subjects (*N* = 314). Interestingly, 7 of the 249 FoMO-responding focus group discussion participants spontaneously reported that they experienced more FoMO in (early) high school, which reinforces the idea that cell phone dependent behaviors are highly age-specific.

Appendix A

Prototypical Study Room



BOX PLACED HERE IN NO CELL PHONE CONDITION

EXPERIMENTER SITS HERE



CAMERA HAS FULL VIEW OF ALL PARTICIPANTS

Appendix B

Custom Terminal Utility, the CommandLineClassifier

The CommandLineClassifier functions by iterating through a set of video transcriptions, randomly selecting a question-response pair, then presenting that pair to the command line, an example of which appears below:

```
Q: Do you ever feel your cell phone vibrating, only to check your notifications and see that there are not any?  
A: "I feel like it happens to me a lot. Like I go to check it and there's nothing I'm like, oh." "Or if it's in my backpack  
I always feel like I think my backpack's vibrating."  
---  
Does this answer demonstrate phantom vibrations?  
(0 = NO, 1 = YES, 2 = UNCLEAR)  
Please press 'return' or 'enter' after responding.
```

A research assistant interacts with the command line in order to ‘tag’ or ‘code’ that question-response pair according to a corresponding prompt. The benefits of this tool are that:

- a. The research assistants can ‘tag’ or ‘code’ the participant responses without associating a participant identifier with a response.
- b. The research assistants can ‘tag’ or ‘code’ the participant responses outside of the context of the test session in which the response occurred.
- c. Discrepancies between the two research assistants can be easily resolved, given the nature of the data.csv output file and its subsequent processing (see Appendix D).
- d. Transcription processing can occur much faster than if conducted by hand, line-by-line.

To break down the functionality even further, the CommandLineClassifier supports:

1. Reading in a transcribed text file, with well-defined formatting
2. Storing the participant information contained in the text file
3. Allowing the user to 'tag' or 'code' the contents of the text file, line by line

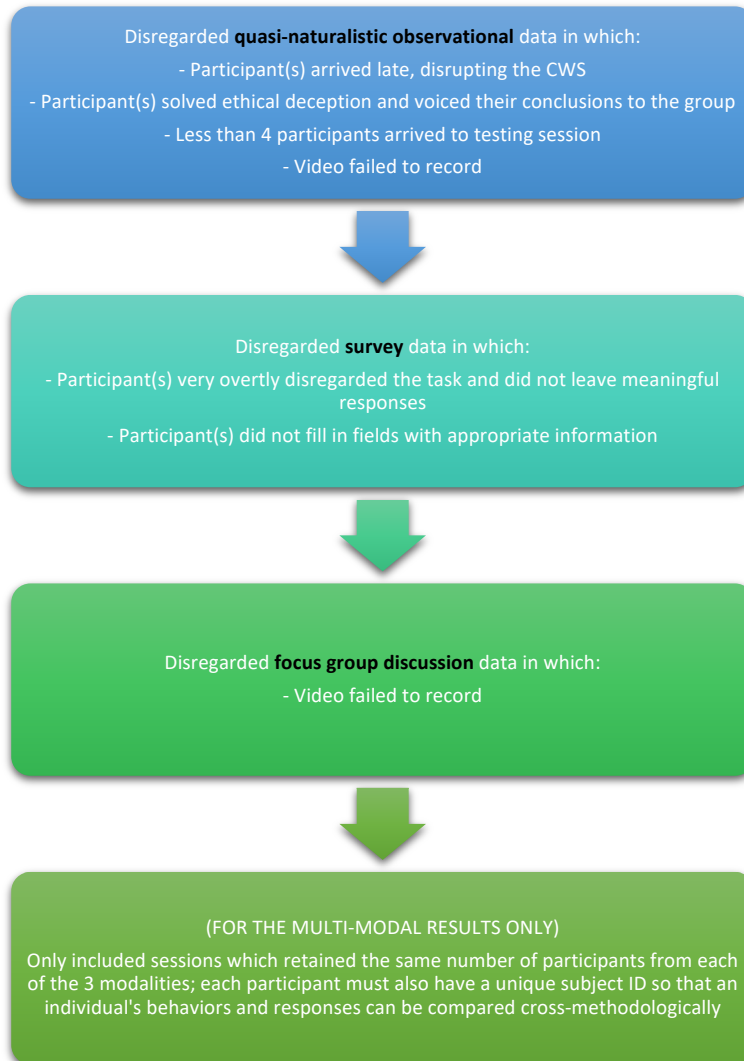
NOTE: As seen in the example above, when the user is prompted to 'tag' or 'code' at the command line, only the data is presented; participants are completely de-identified from the user's perspective

4. Storing the user's responses, as they relate to the participant information
5. Outputting a file (data.csv) which contains the participant information matched to the user's responses

Requests to view and pull from the corresponding GitHub project can be directed to the author.

Appendix C

Data Cleaning and Multi-Modal Analysis



Appendix D

Copy of Survey Questionnaire

Below is a collection of statements about your everyday experience. Using the scale provided please indicate how true each statement is of your general experiences. Please answer according to what really reflects your experiences rather than what you think your experiences should be. Please treat each item separately from every other item.

1. Seeing all of the wonderful things other people are doing on social media can be exhausting.
Not at all true Slightly true Moderately true Very true Extremely true
2. When I have a good time it is important for me to share the details online (e.g. updating status).
Not at all true Slightly true Moderately true Very true Extremely true
3. It bothers me when I miss an opportunity to meet up with friends.
Not at all true Slightly true Moderately true Very true Extremely true
4. I wish there were more places where cell phones did not work so people would talk to each other.
Not at all true Slightly true Moderately true Very true Extremely true
5. I am concerned that people are doing things just so they can post about it on social media.
Not at all true Slightly true Moderately true Very true Extremely true
6. I get worried when I find out my friends are having fun without me.
Not at all true Slightly true Moderately true Very true Extremely true
7. When seen through a Facebook or Instagram feed, people's lives look more amazing than they actually are.
Not at all true Slightly true Moderately true Very true Extremely true
8. Sometimes, I wonder if I spend too much time keeping up with what is going on.
Not at all true Slightly true Moderately true Very true Extremely true
9. It is important that I understand my friends "in jokes."
Not at all true Slightly true Moderately true Very true Extremely true
10. I fear my friends have more rewarding experiences than me.
Not at all true Slightly true Moderately true Very true Extremely true
11. I fear others have more rewarding experiences than me.
Not at all true Slightly true Moderately true Very true Extremely true
12. When I see fun events online, I put them on my calendar right away.
Not at all true Slightly true Moderately true Very true Extremely true
13. I get anxious when I don't know what my friends are up to.
Not at all true Slightly true Moderately true Very true Extremely true
14. When I go on vacation, I continue to keep tabs on what my friends are doing.
Not at all true Slightly true Moderately true Very true Extremely true
15. When I miss out on a planned get-together it bothers me.
Not at all true Slightly true Moderately true Very true Extremely true

16. I find out about important events that I am interested in through Facebook, Twitter, etc.
 Not at all true Slightly true Moderately true Very true Extremely true
17. "Hang up and live" is good advice.
 Not at all true Slightly true Moderately true Very true Extremely true
18. I often check social media so I do not miss fun or important events.
 Not at all true Slightly true Moderately true Very true Extremely true
19. I wish that people would interact more in person instead of being glued to their phones.
 Not at all true Slightly true Moderately true Very true Extremely true
20. The more time I spend on Facebook and other social media sites, the more I miss out on real life.
 Not at all true Slightly true Moderately true Very true Extremely true
21. When I see all of the great things that other people are doing, I feel like I am missing out.
 Not at all true Slightly true Moderately true Very true Extremely true

On a typical day, about how many...

22. Calls do you make? _____
23. Calls do you receive? _____
24. Texts/messages do you send? _____
25. Texts/messages do you receive? _____
26. Minutes are you on your phone? _____
27. Times do you check your phone for new messages or calls? _____
28. Different people do you call/text/message? _____

29. When you are waiting in a line (to order food, coffee, etc.), how long do you wait before using your phone? (to check messages, view social media, etc.)

- Less than 10 seconds
- 11-30 seconds
- 31-60 seconds
- 1-2 minutes
- More than 2 minutes
- I would not use my phone
- Don't know

30. Some people have reported phantom vibrations or phantom ringing from their cell phones, when it seems like they get a call or a message but do not see anything when they check their phones. Has this every happened to you?

- | | Yes | No |
|--|-----------------------|-----------------------|
| Phantom ringing | <input type="radio"/> | <input type="radio"/> |
| Phantom vibration | <input type="radio"/> | <input type="radio"/> |
| Phantom notification (image on the screen) | <input type="radio"/> | <input type="radio"/> |

31. What type of cell phone do you have?

- Touch screen (iPhone, Android, Windows, etc.)
- Flip phone (without touch screen)
- Windows (without touch screen)
- Slide phone with a full hard keyboard
- Palm/Blackberry/etc. with a hard keyboard
- Don't know

Please indicate the degree to which you agree or disagree with the following statements:

32. I have used my mobile phone to make myself feel better when I was feeling down.

Disagree Strongly	Disagree Moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree Strongly
----------------------	------------------------	----------------------	----------------------------------	-------------------	---------------------	-------------------

33. I have used my mobile phone to talk to others when I was feeling isolated.

Disagree Strongly	Disagree Moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree Strongly
----------------------	------------------------	----------------------	----------------------------------	-------------------	---------------------	-------------------

34. I feel anxious if I have not checked for messages or switched on my mobile phone for some time.

Disagree Strongly	Disagree Moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree Strongly
----------------------	------------------------	----------------------	----------------------------------	-------------------	---------------------	-------------------

35. I become irritable if I have to switch off my mobile phone for meetings, dinner engagements, or at the movies.

Disagree Strongly	Disagree Moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree Strongly
----------------------	------------------------	----------------------	----------------------------------	-------------------	---------------------	-------------------

36. I feel anxious if I have not received a call or message in some time.

Disagree Strongly	Disagree Moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree Strongly
----------------------	------------------------	----------------------	----------------------------------	-------------------	---------------------	-------------------

37. When I am not using my cell phone, I am thinking about using it or planning the next time I can use it.

Disagree Strongly	Disagree Moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree Strongly
----------------------	------------------------	----------------------	----------------------------------	-------------------	---------------------	-------------------

38. What is your age in years? _____

39. How old were you when you first bought or received a cell phone? _____

40. What is your study code? _____

41. In what academic year are you at UM? 1 2 3 4 5+

42. What is your gender? Female Male Other _____

43. How comfortable or uncomfortable were you while waiting for the experimenter to arrive with the surveys?

Very Uncomfortable	Uncomfortable	Slightly Uncomfortable	Neutral	Slightly Comfortable	Comfortable	Very Comfortable
-----------------------	---------------	---------------------------	---------	-------------------------	-------------	---------------------

44. Did you know anyone else in the group before you participated in the study? Yes No

45. Do you have any comments?