The Cell and the Self
Exploring the Relationship between Cell Phone Involvement and Differentiation of Self

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Dedication

To Team USA, my doctoral cohort. You are my education and my heroes.

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Abstract of Dissertation

The Cell and the Self
Exploring the Relationship between Cell Phone Involvement and Differentiation of Self

In 2015, the Pew Research Center reported that ninety percent of American adults owned a cell phone and sixty-four percent owned a smart phone. Any researcher who set outs to examine the nature of relationships in the 21st century must consider how cell phone technology influences communication and connectedness. Current research reveals that variables such as age, gender, and personality traits influence an individual's level of cell phone dependence (Bianchi & Phillips, 2005; Lee, Chang, & Lin, 2014; Takao, 2014; Walsh, White, Cox, & Young, 2011), and that cell phone dependence is linked to symptoms of anxiety (Billieux, Van der Linden, and Rochat, 2008), depression (Saeb et al., 2015; Thomée, Harenstam, & Hagberg, 2011), sleep disturbances (Jenaro, Flores, Gómez-Vela, González-Gil, & Caballo, 2007; Thomée, Harenstam, & Hagberg, 2011), and low self-esteem (Walsh, White, Cox, & Young, 2011). This study examined the role of age, gender, and differentiation of self in predicting cell phone dependence and cell phone usage. Research data was collected through an Internet self-report survey from 282 adults in the United States and internationally. Hierarchical regression analysis reveal that differentiation of self explained a significant amount of variance in cell phone involvement after controlling for age and gender but did not for cell phone use. These results are discussed as they relate to the potential for addressing cell phone dependence through counseling interventions.

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Chapter 1: Introduction

In 2015, the Pew Research Center released the results of a massive project that examined the growth of mobile technology in the United States. As of December 2014, ninety percent of American adults owned a cell phone, and sixty-four percent owned a smart phone. Roughly two-thirds of cell phone owners reported to Pew that they check their phones frequently, even when they receive no alert. Forty-six percent of cell phone owners admitted to sleeping with their phones, because they were concerned that they would miss a text or call in the middle of the night. They described their cell phone as something they "couldn't live without" (Smith, 2015).

Any researcher who set outs to examine the nature of relationships in the 21st century must consider how mobile phone technology influences communication and connectedness. Similarly, any counseling interventions which seek to address coping mechanisms for anxiety or depression, problems with self-image, and maladaptive behaviors in relationships cannot ignore the degree to which cell phones play a role in how a person responds to the world around them and the world within. Cell phones are also a valuable tool to the researcher and the clinician. Because people tend to underestimate their cell phone use (Cohen & Lemish, 2003), these devices can capture facets of problematic use as well as provide instant interventions for those seeking help.

Mobile phone (and more recently smart phone) research has grown increasingly broad in the past decade. Some researchers choose to focus on symptoms associated with mobile phone use, such as anxious or depressive symptoms (Park & Lee, 2012; Saeb et al., 2015; Thomée, Harenstam, & Hagberg, 2011). Others view cell phone addiction through the lens of addiction, suggesting that the criteria for cell phone dependence are

similar to other forms of addiction (Martinotti, Villella, Thiene, & Nicola, 2011; Sahin, Ozdemire, Unsal, & Temiz, 2013; Walsh & White, 2007). Some researchers choose to focus on media use via the Internet on smart devices (Foerster, Roser, Schoenie, & Roosli, 2015), while others look at patterns of calling or texting (Wei, Donner, Steenson, & Rangaswamy, 2008; Park and Lee, 2012; Sahin, Ozdemire, Unsal, & Temiz, 2013; Wei & Lo, 2006). Much of this latter research examines cell phones as relationship maintenance tools, as partners negotiate how frequently they will communicate or teenagers determine how often to reply to their parents (Ramirez, Dimmick, & Feaster, 2008; Yang, Brown, & Braun, 2014).

Young adults are one of the most examined cohorts when it comes to cell phone dependence. Pew Research reports that 98% of young adults ages 18-29 own a cell phone (Smith, 2015), and another survey found that 90% of these individuals sleep with their phone (Lenhart, 2010). Young people also report feelings of anxiety when they are unable to check their phones (Smith & Williams, 2004). Much of the literature examines how cell phone use is related to identify construction among young people, with those dependent on their cell phones less likely to develop internal mechanisms for self-esteem maintenance (Walsh, White, Cox, & Young, 2011). When young people turn to their phones for approval and validation, the more likely they are to engage in problematic use (Walsh, White, & Young 2010).

Due to the relative newness of this field of research, however, there is a lack of a coherent theoretical model for studying the interactions between humans and their mobile devices. This chapter will briefly examine what is known about the problem of cell phone involvement, while the next chapter will explore the gaps in more detail. The

researcher will propose how the systems concept of differentiation of self, originating in Bowen family systems theory (BFST), relates to a person's involvement with their mobile device, and how it can explain other facets of cell phone use. By examining the concepts of BFST, one can establish a framework for examining the problem. A short list of definitions frequently found in the literature will also be provided, as well as the delimitations and limitations of the study.

Statement of the Problem

The existing literature has established that cell phone dependence can cause negative symptoms for the user (Jenaro, Flores, Gómez-Vela, González-Gil, & Caballo, 2007; Thomée, Harenstam, & Hagberg, 2011). But it is difficult to determine whether it is the use of technology itself, or whether other behavioral motivations and/or personality factors explain problem cell phone use, causing a positive feedback loop (Walsh, White, & Young 2010) of individual differences affecting patterns of usage or whether individual differences are themselves affected by the technology. Therefore, behavioral interventions that seek to reduce the duration and frequency of cell phone use (rather than examining the factors that explain or contribute to dependence) may fail, and negative symptoms may persist. Smart devices are here to stay, and they will increasingly be used to accomplish daily tasks. Therefore, counselors are charged with the task of finding a way to challenge individuals to think about how they become dependent on this technology and which motivations can lead to negative symptoms and/or relationship problems.

Researchers have discovered that variables such as age, gender, and personality traits influence an individual's level of cell phone dependence (Bianchi & Phillips, 2005;

Lee, Chang, & Lin, 2014; Takao, 2014; Walsh, White, Cox, & Young, 2011). In addition to these variables, there is a need to examine a construct that is both malleable in the work of counseling and psychotherapy and related to cell phone use. The literature examines constructs such as relationship maintenance and approval motivation (Takao, Takahasi, and Kitamura, 2009), but makes little effort to consider what theoretical framework might lend itself as a lens for understanding problematic phone use. Current speculation is limited to the field of addiction research, with great debate as to whether cell phone dependence is similar to other behavioral addictions (Foerster, Roser, Schoenie, & Roosli, 2015; Martinotti, Villella, Thiene, & Nicola, 2011).

Purpose of the Study

Differentiation of self is a theoretical construct found in Bowen family systems theory. Psychiatrist Murray Bowen (1978) defined differentiation as an individual's ability to remain thoughtful in the face of anxiety and to retain a sense of self among significant relationships. Because this construct measures both interpersonal and intrapersonal functioning, and because cell phones dependence can involve elements of emotional regulation (intrapersonal) and relationship maintenance (interpersonal), the relationship between differentiation and technology use is worthy of examination. If the level of differentiation of self appears to be related to how an individual thinks about and uses their cell phone, then focusing on technology use in the counseling room could be an effective strategy in working with an individual, when addressing interpersonal conflict and problems with emotional regulation. Similarly, these findings would suggest that working on strengthening differentiation of self in the context of therapy would also address problematic phone use and its negative consequences. The purpose of this study,

therefore, was to examine whether this relationship between level of differentiation of self and problematic cell phone use exists. The strength of this relationship can be best understood if it is weighed against other known variables that influence cell phone behavior and potentially moderate the relationship between differentiation of self and cell phone involvement and use.

Research Questions & Hypotheses

Research has found that differentiation of self functions as a filter through which emotional reactivity and symptoms interact (Knauth & Skowron, 2004). Because emotion regulation is often a motivation for cell phone use, it is worth investigating whether differentiation influences an individual's involvement with their cell phone and how often they use it. Differentiation may be related to both cell phone use and involvement by affecting one's ability to regulate emotions, maintain an autonomous "I" position in a relationship, and preserve interpersonal relationships. When self-worth is dependent on approval from other rather than intrinsic validation, these people will be more likely to seek out positive outcomes from phone use (Crocker & Wolfe, 2001). Therefore less differentiated individuals, who lack a more solid definition of self, are possibly more likely to engage in cell phone involvement to manage emotions and relationships. Therefore the following research questions were examined and hypotheses were tested.

Research Question 1

To what extent do age, gender, and differentiation of self predict involvement with a cell phone?

Hypothesis 1

The researcher predicted that age will be inversely related to cell phone involvement (Bianchi & Phillips, 2005; Walsh, White, Cox, & Young, 2011). The researcher also predicted that the relationship with cell phone involvement will be stronger for female participants compared to male participants (Billieux, Van der Linden, & Rochat, 2008; Walsh, White, Cox, & Young, 2011; Takao, 2014). Differentiation of self was predicted to be inversely related to cell phone involvement, and the relationship will be strong. The researcher also considered using personality trait as a covariate, using the Ten-Item Personality Inventory (TIPI), a ten-item measure of the Big Five personality dimensions (Gosling, Rentfrow, & Swann, 2003). Past research has found that personality traits related to cell phone use and involvement (Bianchi & Phillips, 2005; Ehrenberg, Jukes, & White, 2008; Ezoe, Toda, Yoshimura, Naritomi, & Den, 2009; Takao, 2014).

Research Question 2

To what extent do age, gender, and differentiation of self predict cell phone use?

Hypothesis 2

The research predicted that age will be inversely related to cell phone use (Bianchi & Phillips, 2005; Walsh, White, Cox, & Young, 2011). The researcher also predicted that cell phone use will be relatively equal between male and female participants. Finally, differentiation of self was assumed to be inversely related to cell phone use, but that the relationship would prove weak. The researcher also considered

using personality trait as a covariate, using the Ten-Item Personality Inventory (TIPI), a ten-item measure of the Big Five personality dimensions (Gosling, Rentfrow, & Swann, 2003).

Research Question 3

To what extent do age and gender moderate the relationship between differentiation of self and cell phone involvement?

Hypothesis 3

The researcher predicted that age and gender would moderate the relationship between differentiation of self and cell phone involvement as follows: older participants' level of differentiation of self would be inversely related to cell phone involvement (Bianchi & Phillips, 2005; Walsh, White, Cox, & Young, 2011). For female participants, the relationship between differentiation of self and cell phone involvement was assumed to be strong. For male participants, the relationship between differentiation of self were assumed to be weak (Billieux, Van der Linden, & Rochat, 2008; Walsh, White, Cox, & Young, 2011; Takao, 2014).

Research Question 4

To what extent do age and gender moderate the relationship between differentiation of self and cell phone use?

Hypothesis 4

The researcher hypothesized that age and gender would moderate the relationship between differentiation of self and cell phone use as follows: older participants' level of differentiation of self will be inversely related to cell phone use (Bianchi & Phillips, 2005; Walsh, White, Cox, & Young, 2011). For female participants, the relationship between differentiation of self and cell phone use was predicted to be strong; for male participants, the relationship between differentiation of self and cell phone use was predicted to be weak (Punamaki, Wallenius, Nygard, Saarni, & Rimpela, 2007; Takao, 2014).

Exploratory Research Question

Does country of residence moderate the relationship between differentiation and self and cell phone involvement in a model also containing age and/or gender?

In this study, the researcher chose to examine culture as a potential moderating variable. Because most cell phone research has been conducted within a particular region or country (Ha, Chin, Park, Ryu, & Yu, 2008; Jenaro, Flores, Gómez-Vela, González-Gil, & Caballo, 2007; Takao, Takahasi, & Kitamura; Walsh, White, & Young, 2008, 2009), the researcher had no directional hypotheses for this research question. Because critics of Bowen Theory have argued that differentiation of self is a culturally-bound concept specific to Western concepts of autonomy (Essandoh, 1995; Tamura & Lau, 1992), it was possible that among participants from non-Western countries, differentiation of self would exhibit a weak relationship to cell phone involvement.

Theoretical Frameworks

For better or worse, the mobile device is a means of connectivity to others. Thus to examine problematic usage of the device, the theoretical frameworks must encompass assumptions about the nature of the connectivity as well as the behavioral patterns exhibited with a cell phone (Walsh & White, 2007). This research used the theoretical lens of Bowen Family Systems Theory to examine the nature of interpersonal relationships and intrapsychic management of self in regards to cell phone use, and employed Brown's criteria for addiction (1993; 1997) to capture the nature of problematic cell phone use among young adults. These theories work well together because they both involve cognitive elements as well as interpersonal ones.

Bowen theory. There are numerous debates about the impact of mobile phone use. Some researchers assert that smart phones make us too connected, while others suggest that they promote distance among humans (Hall & Baym, 2012; Mihailidis, 2014). There are both positives and negative outcomes for cell phone use, both for the individual and his or her relationships. The literature also highlights interpersonal and intrapersonal motivations behind cell phone use. How we use our cell phones and how they impact our relationships may, however, be predetermined by other factors. One factor worth examining is the level of differentiation of self, highlighted in Bowen family systems theory. Theorist and psychiatrist Murray Bowen focused his work in family therapy on an individual's ability to maintain self-awareness while maintaining connections within the family and other relationships systems. This construct is known as differentiation of self (Bowen, 1978).

Individuals who exhibit higher levels of differentiation show emotional flexibility in the presence of anxiety. Those with lower levels of differentiation, however, become easily reactive, losing their sense of self in the presence of anxiety in the relationship system (Kerr & Bowen, 1988). In many ways, the concept of differentiation is reflected in the challenges of the mobile phone user. Remaining thoughtful in the face of anxiety becomes difficult when a device that can promote distraction and alleviate boredom is constantly at one's fingertips (Sahin, Ozdemire, Unsal, & Temiz, 2013). And maintaining a sense of self in the presence of others can prove difficult when family, friends, and romantic partners are instantly available twenty-four hours a day. Therefore, persons with lower levels of differentiation might face the temptation to promote intrapsychic and interpersonal fusion by unlocking their phone. In the following chapter, these concepts of Bowen Theory will be explored more thoroughly.

Brown's theory of addiction. There is debate among researchers whether significant use or involvement with a cell phone qualifies as a behavioral addiction. Behavioral addiction is thought to be similar to substance addiction, but differs in the reality that a person isn't addicted to a physical substance but to the emotional reaction triggered by the behavior (Alavi et al., 2012). Among researchers, there is no consensus regarding a framework for technological addiction or cell phone addiction. Some researchers use the terms "cell phone addiction" or "problematic cell phone use" (Walsh & White, 2007; Foerster, Roser, Schoenie, & Roosli, 2015; Martinotti, Villella, Thiene, & Nicola, 2011). However, the most frequently used theoretical framework is Brown's (1993; 1997) criteria for behavioral addiction (Martinotti, Villella, Thiene, & Nicola, 2011), which arose from his study of pathological gambling and the desire to distinguish

addiction from high engagement in a behavior. Brown's framework was adopted by other researchers who were influential in establishing the DSM criteria for gambling addiction (Griffiths & Hunt, 1998; Young, 1996). Brown's framework was first introduced to the study of cell phone behavior by Walsh, White, & Young (2008), who found all of Brown's criteria for addiction in their qualitative research on descriptions of mobile phone use. Brown's (1993) indicators include:

Cognitive salience. A person's thoughts are dominated by the behavior.

Euphoria. The experience of a "high" prior to engaging in the activity.

Tolerance. Over time, the behavior must be performed to a greater extent to achieve the same "high."

Withdrawal. Stopping the behavior results in negative emotions and negative physical symptoms.

Conflict with others. Performance of the behavior results in conflict with others and inner conflict.

Relapse and reinstatement. Despite attempts to quit or reduce the behavior, the individual resumes the activity with the same level of intensity.

There are indeed limitations to using Brown's criteria in examining cell phone use. For one, the qualitative constructs in the theory have not been tested empirically. Walsh, White, & Young (2008) also note that Brown's criteria suggest that euphoria is experienced in anticipation of the behavior, whereas with cell phone use, the user experiences euphoria when they receive a message. Other researchers have admitted there are multiple confounding behaviors that explain cell phone use, which makes it difficult to establish that they are addicted to the technology (Tossel, Kortum, Shepard, Rahmati,

& Zhong, 2015). For example, an individual might be more drawn to excessive phone use when they are in a romantic relationship or engaged with a particular mobile game. Also, though the concept of cell phone involvement does contain components of addiction, it does not constitute addiction as a whole. Therefore, the researcher has chosen not to use the term "cell phone addiction" to describe the involvement. However, because it is the most commonly used framework and incorporates both cognitive and behavioral elements of dependence, the researcher chose Brown's theory as the framework for examining cell phone involvement in this research.

Overview of Context and Methods

This study recruited research participants 18 and older who own a cell phone. The researcher gathered demographic characteristics including age, gender identity, country of residence, highest educational level completed, occupational status and relationship status. For a large and diverse sample size, the researcher targeted various social media platforms frequented by young adults. Data was collected anonymously using an online web-based survey. The design of the study is quantitative, using hierarchical linear regression to test for the effects of differentiation of self and several moderators. More specifically, the researcher tested whether any or all of the four subscales of the Differentiation of Self inventory could explain additional variance in both cell phone use and cell phone involvement, above and beyond demographic factors commonly related to these variables, including age and gender.

Significance of the Study

Highlighting cell phone involvement and use in the field of counseling can provide valuable insights for both the researcher and the clinician. One of the goals of

counseling is to encourage individuals to reflect on their functioning in interpersonal relationships and their ability to regulate emotional reactivity. Therefore, because individuals use their cell phones on a daily basis (Smith, 2015), they have constant access to information regarding how and when they interact with others or how they seek to alleviate anxiety or boredom. By using Bowen's concept of differentiation of self (1978), researchers can examine how constructs such as emotional reactivity, emotional cutoff, and interpersonal fusion play a role in cell phone use or involvement. This research also contributes to the lack of quantitative research examining Bowen's concepts as they relate to human behavior in the modern relationship system. Finally, because most cell phone research is limited to undergraduate students within a particular region or country, this research explored the influence of age and culture by sampling a broader population.

Definition of Terms

In the literature, two major terms have been used to examine a person's relationship with a mobile phone: cell phone involvement and cell phones use.

Cell phone involvement. Walsh, White & Young (2010) defined cell phone involvement as having two components. The first is cognitive, which describes when a person is thinking about their phone or experiencing distress when they cannot check it. The second is behavioral, which involves actions such as using the phone and keeping it in close. This research adopted these components, defining cell phone involvement as the extent to which an individual is cognitively and behaviorally involved with their cell phone, as measured by Mobile Phone Involvement Questionnaire (Walsh, White, & Young, 2010).

Cell phone use. In the literature, cell phone use (or smart phone use for more recent studies) is defined by two variables, frequency and duration. Frequency is defied by Saeb et al. (2015) as the number of times an individual interacts with the smart phone (i.e. checking for messages, making a call, unlocking the screen, etc.). They define duration as the amount of time a person spends interacting with the phone (i.e. playing a game, sending a text, browsing the Internet, etc.) Frequency of use was calculated by summing messages sent and received (including texts and social media platforms) and calls sent and received, following the precedent set by Walsh, White, Cox & Young (2011), who created a scale for mobile phone use.

Differentiation of self. This concept was defined by psychiatrist Murray Bowen as the amount of fusion between the emotional and intellectual functioning of an individual (Bowen, 1978; Kerr & Bowen, 1988). Differentiation of self consists of an intrapersonal component, which describes how well an individual can access intellectual functioning in the face of anxiety, and an interpersonal component, which describes an individual's ability to retain a sense of self within significant relationships. This research adopted the understanding the differentiation of self as the ability to respond flexibly and adaptively to stressful events, both intrapersonally and interpersonally, an ability measured by the Differentiation of Self Inventory (Skowron & Schmitt, 2003).

Problematic cell phone use. Researchers in the literature have chosen to use the terms "cell phone addiction" and "problematic cell phone use" interchangeably (Walsh & White, 2007; Martinotti, Villella, Thiene, & Nicola, 2011). Foerster, Roser, Schoenie, & Roosli's (2015) define problematic use as the experience of "unpleasant symptoms of withdrawal when switching off their mobile phone or being out of range" (p. 277). This

research defined problematic use as cell phone use behavior and thinking about cell phone which results in symptoms of withdrawal.

Delimitations and Limitations

A major delimitation of the study involves the choice to forego the gathering of qualitative data about the nature of cell phone involvement. Using survey data can fail to capture the particulars of interactions (i.e. media use vs. communication) that can provide greater insight of the relationship between phone use and the individual's interaction within their relationship system. It is possible that more descriptive research is necessary in order to isolate the nuances of phone use that reflect person-to-person interaction. However, by choosing to focus on collecting cell phone use data focusing on calling and messaging, the researcher was able to capture interactions of communication rather than media use. Though other facets of smart phone use might be interesting to investigate, they were explored within this particular study.

Due to the breadth of literature on technology addiction, this research deliberately excluded literature on media addiction as it relates to cell phones (i.e., game addiction, Internet addiction), because the behavior does not involve an overt interpersonal component. However, it is possible that some insight into the relationship between media involvement and differentiation of self was overlooked, or data collected on cell phone involvement might account for media dependence more than dependence on communication with others. Also rather than limiting participants to the young adult age group previously identified as exhibiting high frequency cell phone usage in past research (Bianchi & Phillips, 2005; Walsh & White, 2006), this study opened participation up to all ages.

There are also several limitations to the study. Because the researcher used recruitment tactics via the Internet, there was no way to guarantee the sample is representative of the population and phone use across age and gender identity. However, increased ubiquity of access to the Internet in recent years has been found to produce robust and representative samples (Mathy, Schillace, Coleman, & Berquist, 2002; Risson & Moors, 2006). Also, the length of the surveys may have lead to participants answering items hastily or untruthfully. In the literature, people tend to underestimate their cell phone use or they might do so because of a social desirability bias (Cohen & Lemish, 2003). The study also failed to capture other moderating variables of cell phone involvement in use that might provide greater insight into the role of differentiation of self or its lack thereof in technology use. Also, because the Differentiation of Self-Inventory (Skowron & Schmitt, 2003) was intended originally for adults who are in committed relationships, it may have fail to capture an accurate picture of the lives of those young adults who are in relationships that are not yet committed. Finally, by only examining the degree of involvement and cell phone use such as sending messages and calling, the data did not capture whom an individual is speaking to or what other features of their phone they are accessing, two components that might provide further insight into the nature of behavioral addiction. These limitations were considered manageable since the research in this area is so limited and study feasibility was increased by limiting the number of variables to be studied.

Summary

Counseling researchers in the 21st century must consider how mobile phone technology influences communication and connectedness in the relationship system.

Because there is a lack of a theoretical model for studying the interactions between humans and their cell phones, this research used Bowen family systems theory, particularly the concept of differentiation of self, to examine its relationship to an individual's behavioral and cognitive involvement with their cell phone. This research also incorporated Brown's theory of behavioral addiction to examine the construct of cell phone involvement. Though variables such as age and gender can influence an individual's level of cell phone dependence, there is also a need to examine a construct such as differentiation of self that is malleable in the work of counseling and psychotherapy. This study is significant to the field of counseling because by using Bowen's concept of differentiation of self, the researcher could examine how constructs such as emotional reactivity, emotional cutoff, and interpersonal fusion play a role in cell phone involvement. Also, this study contributed to the lack of quantitative research examining the concepts of Bowen family systems theory as they relate to human behavior.

Chapter 2: Review of the Theoretical and Empirical Literature

The transition into adulthood dictates that one must learn to balance individual autonomy and connectedness with others (Hall & Baym, 2012). A young adult negotiates autonomy from parents by learning to live independently, and he or she also works towards connecting with peer networks and romantic partners. In recent years, these processes have increasingly influenced how and when a young adult chooses to interact with his or her mobile phone. Bowen Family Systems Theory (Bowen, 1978) uses the concept of differentiation of self to describe and measure how the individuals retains a sense of self when in connection with others; therefore this construct can be used to examine a young adult's involvement with cell phone technology. This chapter will review the literature as it relates to trends in relationship maintenance via the mobile device, the concept of differentiation of self and its relationship to young adulthood, and the definition and evidence of problematic cell phone use.

Cell Phones and Relationships

People use mobile phones for a number of reasons. Many researchers have chosen to focus on the need for belonging, defined as the need for established interpersonal relationships (Baumeister and Leary, 1995). Mobile phones allow people to establish frequent communication with others who are not physically present and to feel valued when a response is received via text, call or social media (Gardner and Steinberg, 2005; Walsh, White, and Young, 2009). Texting or calling has also been linked with the need for family cohesion and supportive communication from relatives and friends. (Wei, Donner, Steenson, & Rangaswamy, 2008; Park and Lee, 2012; Sahin, Ozdemire, Unsal, & Temiz, 2013; Wei & Lo, 2006). This section will explore relationship maintenance via

cell phone use, as well as its impact on young adults' relationships with peer networks, romantic partners, and parental relationships.

Researchers have various theories about whether and how cell phone communication is distinct from face-to-face communication in a relationship. Daft and Lengel (1984) suggested that there are fewer social cues when communicating via technology, thereby limiting how much information can be conveyed to the recipient. In addition to connecting people where face-to-face communication is not an option (Khonou, 2012), mobile phones allow people to be less inhibited and strategize about how they would like to present themselves in a way that face-to-face contact does not allow (McKenna and Bargh, 2000). Walther (1996) described this effect as "hyperpersonal" communication. Yang, Brown, and Braum (2014), however, suggested that while social media communication via the Internet is unique, people communicate via cell phone the same way that they communicate in person due to familiarity, the personal nature of texting, and the existence of previous in-person conversation.

In the developmental life of a relationship, the frequency and depth of interaction will evolve. Cell phone use reflects many of the strategies people use for relationship maintenance (Yang, Brown, & Braun, 2014). As cell phones increase the ability to be instantly available to people, to give and provide reassurance, they also impact the nature of relationships (Pomerantz, 2013). Rather than establishing new relationships, they primarily serve to strengthen existing ones (Axelsson, 2010; Ishii, 2006; Kim, Kim, Park, & Rice, 2007; Ling and Yttri, 2002). More so than email and instant messaging, mobile phones have been found to gratify the needs for companionship and closeness in relationships (Ramirez, Dimmick, & Feaster, 2008).

There are observed benefits to cell phone contact in relationships. In a survey of 197 college students, Jin and Peña (2010) discovered that young adults (*M= 19.4*) who called their romantic partner more frequently via a cell phone experienced lower relational uncertainty and more love and commitment. However, in another study which invited 793 college-aged students (ages 18-23) from three continents to reflect on their mobile phone use, young people reported increasingly having trouble distinguishing between relationships built solely on cell phone communication and those based on real life interaction (Mihailidis, 2014). These increasingly tethered young adults, according to the survey, expressed doubt that their cell phones facilitated vibrant communication and enriched their consumption of information in their day-to-day lives.

Inevitably, however, there is tension between this closeness fostered via cell phone connection and the desire of the young adult to maintain autonomy and choose when and how to respond to a partner (Hall & Baym, 2012). Baxter and Simon's (1993) dialectical theory describes a relationship as a balance between collaborative and individual processes. The autonomy-connection dialectic (also known as the independence-dependence dialectic) is one lens for examining how cell phone communication impacts interpersonal relationships. Duran, Kelly, & Rotaru (2011) reported that cell phone use spurred autonomy-connection conflict when partners differ on what amount of texting and calling was appropriate in a romantic relationship. They found that the more one partner expected the other to be available via phone, the higher the desire to control and restrict freedom. When partners perceived their mobile phone use as similar, there was a higher level of relationship satisfaction (Hall, Baym, & Miltner, 2014).

Hall and Baym (2012) used dialectical theory to examine relationship maintenance in friendships. When surveying 247 American university students, they asked each student to think of the friend with whom they communicated the most via cell phone. They found that participants on average made 2.21 voice calls to the chosen friend every day, and sent and received an average of 38.39 text messages daily. They observed that more frequent calling and texting established more mobile phone negotiation, also known as mobile maintenance, which leads to feeling dependent on the phone. They also found that increased maintenance produces contradictory results, as it was a positive predictor for dependence, which increased student satisfaction, as well as overdependence, which decreased student satisfaction. The researchers also reported that the more guilty or pressured a student felt in responding to their friend, a concept known as entrapment, the more dissatisfied they felt with the relationship.

Cell phones present the possibility of disrupting the balance between autonomy and connection by increasing connectivity and sacrificing autonomy. Katz and Aakhus (2002) described this phenomenon as "perpetual contact," suggesting that cell phones challenge social norms about what amount of contact is appropriate; they also assert that the device can make people experience a lack of control. Hall and Baym (2012) described this access as a "double-edged sword," as it is both the most commonly positive and negative feature attributed to cell phones (Baron, 2011). 24-hour access can lead to relationship conflict in a number of ways. In one study, 23% of participants reported lying via cell phone about what they were doing or where they were (Acharya, Acharya, & Waghrey, 2013). Avoidant individuals also use their phones less when they do not like being able to be reached by their partner at any time (Jin & Peña, 2010). Cell phones also

allow individuals to end relationships without experiencing the reactivity in a face-to-face conversation (Khunou, 2012).

From the literature one can see how cell phones use impacts the development and the maintenance of relationships. Cell phone use reflects many relationship dynamics that exist with or without technology, but it appears to magnify both the positive and the negative aspects of maintenance. For example, while the device can foster closeness and relationship satisfaction, it can equally accelerate the level of contact that disrupts the balance between independence and togetherness. Therefore being able to capture a person's level of problematic cell phone use may be able to predict how susceptible an individual is to the relationship challenges that are reflected and magnified through technology.

Texting and relationships. Texting is also a tool for relationship maintenance in both romantic and friend relationships, as individuals negotiate how often they should text and how quickly they're expected to reply (Brody, Mooney, Westerman, & McDonald, 2009). Texting (also known as SMS communication) is a unique behavior because responses are not always sent immediately after the interaction. Because individuals can communicate without direct or immediate dismissal from others, they can focus more on the purpose of the message itself rather than the response they might receive. However, while text messaging provides the writer with the ability to think before crafting a reply, the expectation of a quick reply to a text is prevalent among young cell phone users (Pomerantz, 2013). The statistic that 90% of 18-29 year olds sleep with their phones reflects the perception of needing to be available at all times to reply (Lenhart, 2010).

Reid and Reid (2007) argue that texting affords a safe, controlled environment to communicate personality qualities that feel too intimate to be shared even with close relationships in face-to-face interactions. Ha, Chin, Park, Ryu, & Yu (2008) found that adolescents feel more comfortable sending text messaging than engaging in face-to-face conversation, and that the ability to text deepened friendships. From their survey of 339 cell phone users ages 20 to 35 in their community, Billieux, Van der Linden, and Rochat (2008) found that texting satisfied an upsetting emotional state by allowing the user to quickly reach out to someone else. However, Jin and Peña (2010) found no significant relationship between avoidance and text messaging among college students, suggesting that the behavior is not used as an alternative for serious conversations that should take place via face-to-face conversation or phone call.

Cell Phones and Romantic Relationships. In a survey of young couples, Heussener

(2011) observed that texting helps relationships become more intimate at a quicker pace, though it may also engender a false sense of security. Text messaging occurs more frequently in the earlier stages of a relationship, typically declining with time (Jin and Peña, 2010). Users report feeling loved or valued when receiving a text from a significant other (Walsh, White & Young, 2008), but ironically, the lack of a response to a text message increases social attraction (Antheunis, Valkenburg, & Peter, 2010), a reality that may also increase anxiety (Pomerantz, 2013).

Researchers disagree whether there is a significant relationship between text messaging and attachment style. Pomerantz (2013) found that while the number of phone calls was associated with relational uncertainty, there was no distinction between securely

and insecurely attached adults and the number of text messages they sent to their partner. Jin and Peña (2010) reported that frequent texters will text their partner often, regardless of the characteristics of the relationship. However, Warr (2013) argued that attachment anxiety was associated with more text messages sent between partners. She described texting as a "visual representation of the relationship," arguing that these brief reassurances stored in the memory of a phone are the preferred method of communication because they are less intrusive to the recipient (pg. 286).

Communicating with mobile technology is a testing ground for balancing the need to connect and the need to function autonomously, so any two people in a relationship must work to develop guidelines for how and when they communicate via cell phone (Miller-Ott, Kelly, & Duran, 2012; Quan-Haase, Cothrel, & Wellman, 2005). Without these rules, tensions can arise (Petronio, 2002). For example, Laursen (2005) found that there is a "reply norm" for text messaging. This means that when a person sends a text, there is an expectation of a response, and neglecting to respond ''is a threat to the interaction and the social relationship'' (pg. 72).

In another study where researchers surveyed 210 undergraduate students, one third of participants reported that they set rules with their romantic partner about when they should be available via cell phone and how frequently they should reply (Duran, Kelly, & Rotaru, 2011). Miller-Ott, Kelly, & Duran (2012) found that young adult romantic partners have rules about when it is appropriate to use a cell phone in the presence of the other, when it is acceptable to contact each other via phone, whether it is appropriate to discuss relationship issues via text, and how frequently a partner can contact the other via call or text when they do not respond. The study also found that

college students who felt obligated to be constantly available to their boyfriend or girlfriend were less satisfied with their relationship and with their cell phone.

From the literature it appears that just as cell phones can foster intimacy at a quicker pace, they may also present individuals an opportunity to engage in relationship maintenance at an earlier stage in the relationship. For example, disagreement about the reply norm for texts may trigger conflict and anxiety earlier in a relationship, but also provide an opportunity for negotiating the autonomy-connection dialect. This testing ground provides an opportunity for young adults in particular to experiment with the balance of independence and dependence necessary for a successful relationship.

Cell Phones and the Parental Relationship. Young adulthood marks a decrease in contact with family members, accompanied by an increase in the quality of those relationships (Parker, Lüdtke, Trautwein, & Roberts, 2012). Parents who choose not to respect these boundaries, exerting control over a distance, may find that they are fighting more frequently with the adult child (Hawk, Keijsers, Hale, & Meeus, 2009) or that their children experience higher degrees of depression and anxiety (Hale, Raaijmakers, Gerlsma, & Meeus, 2007). These enmeshed family relationships (referred to as "fusion" by Bowen, 1978), prevent the development of autonomy (Pettit, Erath, Landsford, Dodge, & Bates, 2011).

Emerging adults often negotiate both autonomy from and connectedness to their parents through cell phone use. On average, parents and college students contact each other more than 10 times per week (Hofer & Moore, 2010), leaving researchers considering how this can impact the developmental transition into adulthood (Parker, Lüdtke, Trautwein, & Roberts, 2012). Segrin, Woszidlo, Givertz, & Montgomery (2013)

surveyed 653 parent-child dyads and reported that 86% of young adults spoke with their parents at least several times a week, with 26% contacting parents multiple times a day. Because there is no previous research available on amount of contact prior to cell phones, one cannot assume that cell phones lead to overparenting. As the researchers discovered, however, cell phone contact is a valuable means of capturing behaviors that reflect parental and emerging adult anxiety.

In their survey of 207 university students, Miller-Ott, Kelly, and Duran (2014) found that there is a positive relationship between young adult's cell phone satisfaction and satisfaction with their relationships with their parents. The researchers observed a positive association between frequent cell phone contact and the young adults' perceptions of closeness with their mothers. Young adults participating in the study also reported more satisfactory relationships with their mothers when cell phone use was guided by rules. These rules included not repeatedly contacting the other person if they do not respond, and not engaging in arguments over cell phone. This supports research that has found that establishing and maintaining cell phone rules regulates the blurring of boundaries that can occur between young adults and their parents (Ledbetter et al., 2010; Miller-Ott, Kelly, & Duran, 2012). To test and expand these boundaries, young adults may resort to limiting when and how their parents can access them via cell phone (Baron, 2008), such as pretending a phone is off or lying about their whereabouts (Campbell, 2006).

These rules of cell phone communication between parent and child often solidify around the time the child goes to college (Ledbetter et al., 2010). In one study, Green (2007) observed that the parents and college students initiated contact with one another in

a rather symmetrical pattern, even though young adults reported that they preferred to initiate contact with their parents. This provides evidence that parents struggle with the process of separation and individuation as well (Kins, Soenens, & Beyers, 2011), although contact between fathers and their children remains lower than contact between mother and child (Chen & Katz, 2009; Miller-Ott, Kelly, & Duran 2014). This is expected, given that mothers experience high levels of separation anxiety when their children leave for college and that mothers remain the primary caregivers for offspring (Kins, Soenens, & Beyers, 2011; 2013).

From reading the literature on parent/child cell phone communication, one observes that a similar relationship between the establishment of rules and relationship satisfaction is important just as it is in romantic relationships among young adults. Just as romantic partners negotiate the balance between autonomy and connectedness, so must the parent and child when the child enters adulthood. It is difficult to determine from the literature whether the nature of this relationship maintenance is merely captured through measuring cell phone data, or whether the device itself intensifies this tension.

Gaps in the Research. There are many gaps in the research on relationship maintenance and communication via cell phone. There exist no current studies that attempt to explore the differences between relationship type (friendship, romantic partners, family, etc.) and the nature of cell phone use. Researchers also have reported a lack of examination as to how factors such as living environment, work environment, other communication technologies, and relationship status influence the data gathered on young people's relationships with their cell phones (Walsh, White, Cox, & Young, 2011). Sample sizes are largely from university students, preventing the collection of data from a

more diverse population of young adults, in particular those who don't leave home at the age of 18 or who do not attend college. The research is largely survey-based, depending on cell phone user's best estimation of their usage. Also, by asking research participants to make generalizations of relationship satisfaction, researchers may gather results that only reflect users' feelings about relationships in the moment rather than over a period of time. In summary, cell phone research to date lacks an examination of how cell phone use differs depending our purpose and mindset for picking up a cell phone.

Differentiation of Self

Cell phone use influences and reveals how individuals choose to cope with anxiety, manage relationships, and seek approval. By looking at cell phone use as a reflection of an individual's functioning with a larger relationship system, one can predict that differentiation of self, a concept found in Bowen Family Systems Theory (1978), could be related to an individual's level of cell phone involvement and use. Murray Bowen (1978) defined differentiation of self as the amount of fusion between the emotional and intellectual functioning of an individual. The intrapsychic component of differentiation involves the ability to remain thoughtful and aware of emotions in the face of anxiety. The interpersonal component contains the ability to remain autonomous and retain a sense of self with significant relationships, particularly one's family of origin (Bowen, 1978; Kerr & Bowen, 1988). The concept of differentiation is similar to autonomy-connection dialectic in Baxter and Simon's (1993) dialectical theory, but it expands on the construct by adding an intrapsychic component, namely the level to which one can retain intellectual functioning in the face of reactivity.

According to Bowen, the appeal of differentiation is that individuals who exhibit higher levels tend to respond more flexibly and adaptively during stressful events, as the emotional response to the situation does not take complete control (Bowen, 1976). Individuals with lower levels of differentiation are more emotionally reactive as their own anxieties are activated in response to the reactivity of those around them and in the family system (Kerr & Bowen, 1988). More differentiated individuals also exhibit greater psychosocial maturity and adjustment, better problem-solving skills, and fewer problem behaviors (Gavazzi, Anderson, & Sabatelli, 1993; Murdock and Gore, 2004; Skowron, 2000). They also have more adaptive strategies for coping, demonstrating more reflective styles of reaction to stress than reactive and suppressive methods (Murdock and Gore, 2004). Less differentiated individuals are more susceptible to chronic anxiety and psychological and physical symptoms (Bohlander, 1999; Elieson & Rubin, 2001; Griffin & Apostal, 1993; Harvey, Curry, & Bray, 1991; Skowron & Friendlander, 1998; Skowron, Holmes & Sabatelli, 2003; Tuason & Friedlander, 2000). They are also more likely to choose a romantic partner with a comparable level of differentiation, resulting in marital conflict and the activation of emotional triangles (Miller, Anderson, & Keala, 2004; Skowron, 2000). Jenkins, Buboltz, Schwartz, & Johnson (2005) found that differentiation is a significant predictor of healthy psychosocial development in adulthood.

Though there is evidence that using Bowen Theory in a clinical setting can prove effective (Bowen, 1978; Gilbert, 1999; Knauth, 2003; Papero, 1990), very few empirical and systematic studies have been conducted on the constructs that make up the theory. Critics of Bowen Theory have argued that differentiation of self is a culturally bound

concept (Essandoh, 1995; Tamura & Lau, 1992), while defenders argue that the emphasis on interpersonal connectivity for maturity makes the construct cross-culturally relevant (Boyd-Franklin, 1989; Carter & McGoldrick, 1999; Gushue & Sicalides, 1997). Responding to the paucity of instruments measuring Bowen concepts, Skowron and Friendlander (1998) developed the Differentiation of Self Inventory (DSI).

The DSI consists of four subscales which measure the Bowen constructs of emotional reactivity, emotional cutoff, the "I" position, and fusion with others. Emotional reactivity is defined as an inability to maintain calm when faced with the emotionality of others (Kerr & Bowen, 1988). Emotional cutoff is characterized by a tendency to create emotional distance between oneself and family and exaggerate the level of independence (Nichols & Schwartz, 1998). Individuals with a high level of "I" position are able to maintain a defined sense of self while pressured by others to conform (Bowen, 1978). And finally, fusion with others is characterized by seeking approval and recognition above firmly held convictions or beliefs (Bowen, 1976). Together, these concepts provide a picture of a person's overall level of differentiation.

Differentiation of self and young adults. A drawback to the DSI is that many of the items ask one to answer questions about the relationship with their spouse, which is irrelevant to many young adults. Therefore in 2004, Knauth and Skowron tested the reliability and validity of the Differentiation of Self Inventory with adolescents, reporting good internal consistency reliability, with a Cronbach's alpha coefficient of .84. They found that the differentiation of self served as a mediating variable between chronic anxiety and the development of symptoms in adolescent populations. Bowen purported that the level of differentiation of self is relatively established by early adulthood, but that

it could increase if the individual took steps to manage anxiety within the emotional family unit and to adapt to the events of life, both good and bad (Bowen, 1978).

Researchers have developed other instruments for adolescent populations to study concepts like the multigenerational ones in Bowen Theory (Boszormenyi-Nagi & Ulrich, 1981; Bowen, 1978; Williamson, 1982), but none of them thoroughly explore the concept of differentiation of self and none of them consider the potential relationship to technology. McCollum's Emotional Cutoff Scale (1991) examines the parent-child relationship by assessing how much the latter manages anxiety through the concepts of emotional and physical distance. The Personal Authority in the Family System Questionnaire (Bray, Williamson, & Malone, 1984) measures the interpersonal component in differentiation of self, but neglects the intrapsychic concepts.

Differentiation of self has also been found to function as a mediating variable between acute stress of college and functioning among young people (Skowron, Wester, & Azen, 2004), and cross-cultural validity of the measure among minority college students has also been established (Skowron, 2004). This research suggests that young people are equally able to define a self and remain thoughtful in the face of anxiety as older adults.

From the literature, one can see how the concept and measure of differentiation of self is uniquely suited to capture an individual's attempts and success at balancing autonomy and connectivity as well as remaining thoughtful when emotionally reactive. One can also observe similarities between comparable level of differentiation among partners and the research that there is less relationship conflict with partners agree on cell phone rules (Duran, Kelly, & Rotaru, 2011). Therefore, it is possible that the less

differentiated an individual is, the more likely his or her relationship will be disrupted by relationship maintenance via cell phone.

Gaps in the literature. There are many gaps in the literature testing Bowen's concept of differentiation of self. There are a very limited number of studies that examine the differences in differentiation and the subscales by gender. There are even fewer studies that assess the applicability of Bowen theory and the concept of differentiation of self across different cultures. There is also no research on the relationship between differentiation of self and behavioral dependence. Skowron's scale (2004) is largely dependent on participants having a romantic partner or being able to imagine how one might act in the future in a romantic relationship, not examining other behaviors which might be more relevant to measuring differentiation in single adults. The scale also does not allow for differences in interpersonal interactions among various culture. Also, because Bowen Theory is a systems theory, measuring differentiation levels in a single individual in the system does not arguably provide an accurate picture of how a system functions in times of anxiety (Cook, 2007). To date there is no literature examining the connection between problematic cell phone use and relationships through the lens of Bowen Theory.

Problematic Cell Phone Use

Choosing frequent cell phone use as the medium of contact in relationships can result in various negative consequences, including physical and psychological symptoms, reliance on the phone as an identity construct, and dependence on communication via cell phone as a source of approval motivation. This section will discuss research investigating characteristics of problematic cell phone use, explore attempts in the literature to describe

problematic cell phone use as an addictive behavior, and examine how cell phone interaction can be measured.

Different measures of cell phone use have been linked with various symptoms in the research. Duration and frequency of cell phone use is associated with depressive symptoms (Saeb et al., 2015; Thomée, Harenstam, & Hagberg, 2011). However, Park and Lee (2012) reported that individuals who use their cell phone to strengthen relationships report lower levels of depression. High usage is also related to sleep disturbances (Jenaro, Flores, Gómez-Vela, González-Gil, & Caballo, 2007; Thomée, Harenstam, & Hagberg, 2011), with sleep quality gradually decreasing as cell phone dependence increases (Sahin, Ozdemire, Unsal, & Temiz, 2013). Some researchers assert that there is no significant correlation between high levels of anxiety and mobile phone use (Jin & Pena, 2010), whereas others have observed a positive relationship (Ha, Chin, Park, Ryu, & Yu 2008; Jenaro, Flores, Gómez-Vela, González-Gil, & Caballo, 2007; Lee, Chang, Lin, & Cheng, 2014; Mihailidis, 2014).

Text messaging is a distinct behavior worth examining because it has been associated with negative symptoms while other phone behaviors have not. In their survey of 108 female undergraduate students, Billieux, Van der Linden, and Rochat (2008) found that there was a positive relationship with anxiety and depression to the number of text messages sent but not the number of calls made. Reid and Reid (2007) observed that participants who were more anxious preferred texting as a medium of contact. Smith and Williams (2004) observed that frequent texters among young adults experienced high anxiety levels when they could not check their cell phones. Lu et al. (2011) proposed that texting perpetuates anxiety because anxious users worry when they do not receive an

immediate reply to a text, a reality that promotes the habit of checking. This checking for texts, more so than responding to them, demonstrates a lack of ability to exercise self-control (Pomerantz, 2013).

Many other negative symptoms have been attributed to excessive cell phone use. One study on cell phone usage among college students reported symptoms such as headaches, irritability, lack of concentration, and declined academic performance accompanying over-usage (Acharya, Acharya, & Waghrey, 2013). Jin and Park (2012) found that excessive calling on cell phone was associated with greater levels of loneliness. Researcher Jon Kabat-Zinn (2005) proposed that there are subtler damages that accompany mobile phone use, such as distracting people from their here-and-now experiences, uncomfortable emotional states, their relationships, and physical cues from the body. Whether cell phone use is directly impacting psychological and physical health, or whether this effect is mediated through other constructs, is difficult to assess. Cotton (2008) suggests that the sense of self-efficacy as it relates to both technology and college life mediates this relationship.

From the literature one observes this apparent contradiction with increased cell phone use. Some observe that behavior improves relationships but others argue it can increase loneliness. Some researchers assert it promotes depression and anxiety, while others argue no such relationships. These debates stir curiosity as to which mediating and moderating factors should be examined when studying problematic cell phone use, and which of these variables most accurately capture the nature of our relationship with each other and our relationship with our devices.

Because mobile phone users view their device as an appendage they cannot live without, cell phones are thought to influence the concept of self-identity (Walsh, White, & Young, 2008). Researchers have found that both mobile phone use and mobile phone involvement are linked to the expression of the self (Mannetti, Pierro, & Livi, 2002; Walsh & White, 2007). Walsh, White, & Young (2010) reported that young adults who are highly involved with their cell phones feel more validation from others, suggesting that use can improve self-esteem. In a later study, they hypothesized that low self-esteem leads to a strong need to attach to others, which is exhibited through a high level of mobile phone involvement (Walsh, White, Cox, & Young, 2011). Park and Lee (2012) found that persons who use their cell phones to care for others exhibit lower levels of depression and loneliness and higher levels of self-esteem. Smith and Williams (2004) conducted a text messaging study where certain participants were deliberately ostracized in text conversations. These participants reported a decrease in self-esteem and negative changes in mood when they were excluded from text message conversations.

Approval motivation, defined as an individual's disposition to seek favorable evaluation from others (Homans, 1974), is associated with low self-esteem because the individual relies on assurance and praise from peers. In their survey of 504 Japanese undergraduate students, Takao, Takahasi, and Kitamura (2009) demonstrated that approval motivation is associated with problematic use, but not with duration of time spent writing and reading text messages. Walsh, White, & Young (2010) found that both self-identity and the need for validation from others could predict how involved an individual was with their phone. If the person is relying on approval via the cell phone,

they might be less likely to develop internal mechanisms for self-esteem maintenance (Walsh, White, Cox, & Young, 2011).

From the literature, one can hypothesize how dependence on the phone for this reinforcement may result in a positive feedback loop that results in deeper mobile phone involvement and/or higher levels of use. The use of the phone can have positive effects on identify, but attempts to decrease cell phone use or times where a phone is out of reach can have negative effects. These observations support the concept of the pseudo-self in Bowen Theory (Gilbert, 2006), defined as an unstable identify construct that shifts in response to the reactions of others. Bowen (1978) hypothesized that when an individual demonstrated high level of pseudo-self (and likewise a low level of differentiation of self), a compliment could easily improve his functioning, and an insult could likewise reduce his functioning. Therefore, one could hypothesize how dependence on the cell phone for validation and evaluation is related to a high level of pseudo-self in the individual.

Problematic cell phone use and addiction. Adriana Bianchi's and James G. Phillips' research (2005) was the first major study on problematic mobile phone behavior. In their article, they describe how they devised and validated a reliable self-report instrument for problem use. Faced with a lack of literature on the subject, they decided to look to addiction literature, in particular research on the psychological predictors of addiction, to develop their scale and explain the behavior. This decision set the precedent for other researchers to use addiction literature and to use the terms "cell phone addiction" and "problematic cell phone use" interchangeably. (Walsh, White, & Young, 2007; Foerster, Roser, Schoenie, & Roosli, 2015; Martinotti, Villella, Thiene, &

Nicola, 2011). Foerster, Roser, Schoenie, & Roosli (2015) defined problematic use as use "whereby affected persons experience unpleasant symptoms of withdrawal when switching off their mobile phone or being out of range" (p. 277).

However, researchers have long debated whether high levels of cell phone usage and involvement qualify as an addiction. Answering this question within an addiction framework remains difficult, as the criteria for addiction vary widely in the literature. For their Smartphone Addiction Inventory, Lin, Lin, & Lee defined four components of addiction: tolerance, withdrawal, compulsive symptoms, and functional importance (2015). Martinotti, Villella, Thiene, & Nicola (2011) used Brown's (1993) criteria for behavioral addiction, which includes cognitive salience (checking the phone dominates thinking and behaviors); conflict with others; euphoria; tolerance; withdrawal; and relapse and reinstatement. In their qualitative research, which also uses Brown's (1993; 1997) criteria as a theoretical framework, Walsh, White, & Young (2008) found all of these indicators in descriptions of mobile phone use from research participants. They report that the most distinct factor observed among those addicted to their mobile phone was the inability to resist checking the device at inappropriate times. Billieux, Van der Linden, D'Acremont, Ceschi, & Zermatten (2007) asserted that cell phone addiction is distinguished by the user's perceived dependence and impulsivity as evidenced by the urgency to use the phone and the lack of perseverance in being able to stay focused on a task.

Many challenges exist when seeking to establish proof of a technology addiction. Tossell, Kortum, Shepard, Rahmati, & Zhong (2015) acknowledge that many confounding behaviors which lead people to their cell phones make it difficult to

establish proof of a technology addiction, making the dozens of scales developed to measure mobile phone addiction problematic. In their critique of technology addiction, Walsh, White, & Young (2008) note one distinction from Brown's (1997) criteria, which suggested that euphoria is experienced during anticipation of the behavior rather than the behavior itself. They argued that mobile phone use is different because it creates euphoria when the user receives a message. Also, Oulasvirta, Rattenbury, Ma, and Raita (2012) reported that participants in their qualitative study described habitual mobile phone use as annoying rather than addictive.

Though the addiction criteria are diverse, researchers argue that addiction criteria are evident when people describe their cell phone habits. Baron (2010) reported that mobile users felt controlled by the device. Griffiths (2003) argued that any behavior that causes excitement can generate addiction, and mobile phone use is exciting for many users. Sahin, Ozdemire, Unsal, & Temiz (2013) asserted that this excitement stems from easing boredom or negative emotions, providing the smartphone user with pleasure and relief from anxiety; this, they argue, is the environment that gives birth to addiction. Addiction rates among the general population are unknown, though researchers are making attempts at estimates. When Tossel, Kortum, & Shepard (2015) gave smartphones to thirty-four people who had never previously owned the device, at the end of their year-long study they found that 62% agreed they were addicted to their iPhones. After conducting an empirical review of the literature, Pérez, Rodríguez, & Ruiz (2012) reported mobile phone addiction rates within the range of 0-38% among research participants.

Many questions arise when examining the use of addiction criteria in studies of cell phone use, particularly because of the lack of consensus regarding a framework for technological addiction. Though measures like the Mobile Phone Involvement Questionnaire measure components of addiction, they do not measure addiction to the technology as a whole (Walsh, White, & Young, 2010). Though Brown's theory (1993; 1997) does appear to be the current best fit, because this theory originally was used to explain gambling addictions, it fails to capture the reality that cell phones facilitate relationships and that the nature of our relationship systems may impact how and when we use our phones and think about them. Brown's criteria are suitable for capturing the nature of cell phone involvement, but another framework such as Bowen Family Systems Theory, is necessarily for exploring the role of cell phones in the relationship system.

Features of problematic cell phone use. Across the literature, one common symptom of dependent smartphone use is known as the "checking habit." Oulasvirta, Rattenbury, Ma, and Raita (2012) defined checking habits as the automatic behavior of unlocking or opening a phone to look for new content or responses to interactions. They also explain that a smartphone check is quick, repeated often, and encourages the user to open other applications during a check. Various environmental and emotional cutes prompt the user to check the device, and the user is rewarded through the alleviation of boredom or anxiety. The researchers also suggest that this information accessed through the applications also serves to reinforce the behavior.

Mihailidis (2014) reported that 31% of a research sample used social media apps on a smartphone more than 13 times a day. The application maker Locket reported that the average person unlocks their smartphone 110 times per day (Aamoth, 2013). Tossel,

Kortum, Shepard, Rahmati & Zhong (2015) found that addicted smartphone users check apps nearly twice as often as non-addicted users. These addicted users also spent less time-per-interaction (TPI) compared to non-addicted users. The researchers argued that the lower TPI rate indicates the user's lack of control or awareness of the behavior. However, whether this checking behavior indicates an dependence on the device itself or the content accessed remains difficult to distinguish. They also suggested that there are alternative ways of interpreting the checking behavior, as young users may perceive their checking habits as "maintaining a conversation in a room full of friends" (Tossell, Kortum, Shepard, Rahmati, & Zhong, 2015, pg. 41). However, in investigating this possibility, they found that addicted users had no more social network contacts than those who did not exhibit addictive behaviors.

The impulse to check a mobile device manifests itself in various forms. Young people have reported hearing false ringtones and feeling ghost vibrations, and they also admitted to looking at their smartphones to avoid uncomfortable social situations such as looking bored or lonely in public. They also described a desire to know what others are doing via social media to ensure they were not being left out of conversations (Mihailidis, 2014). Similarly, the user experiences withdrawal symptoms when they cannot access their phone or are out of cell phone rage (Foerster, Roser, Schoenie, & Roosli, 2015). Young people in survey research have admitted that they would rather give up sex, dental hygiene, exercising, showering, and eating chocolate rather than giving up their cell phone for a period of time (Telenav, 2011). Walsh, White & Young (2008) suggested that symptoms of withdrawal reflected the lack of contact with others rather than use of the device itself. In their study, they reported that mobile phone users felt more disconnected

rather than distressed. However, it's possible that the introduction of smartphone technology since this study has changed how users experience withdrawal.

This literature reflects how the introduction of smartphone technology complicates both the relationship between the user and the device as well as the construction of a framework for understanding it. One can see how a "checking habit" may have everything to do with the nature of anxiety in a relationship system but also nothing to do with others, as a person may be checking their phone constantly for media content and information rather than interactions on social media and text messages. Therefore, to truly understand the connection between relationships and cell phones, a researcher must attempt to separate repeated behaviors which relate to strictly the device or content on the device, and those which involve the communication between two or more people.

Variables related to problem use. Researchers have found multiple factors associated with smartphone dependence. In order to consider the unique effect that differentiation of self has on cell phone use and involvement, one must examine and account for these additional factors.

Age. Of all generations, Millennials are the most likely to use their cell phones to access the Internet and use social networking sites (Smith, 2010). Among the Millennial cohort, the desire to respond to a text message is considered more urgent (Ling, 2010). In their survey of 292 young Australians, Walsh, White, Cox & Young (2011) found that age significantly predicted the frequency of cell phone use as well as an individual's involvement with their phone. Surveying 195 participants ages 18 to 85, Bianchi and Phillips (2005) found that age was significantly related to problematic phone use.

Constant use by this age group inspired the words "Nomophobia," which describes a fear of being unable to reach one's phone or out of contact via phone (Sahin, Ozdemire, Unsal, & Temiz, 2013). There are also public safety risks associated with overuse, with 20-33% of young adult drivers engaging in texting while driving (Lenhart, Ling, Campbell, & Purcell, 2010). One study in the United Kingdom found that roughly two-thirds of teenagers are disturbed by the thought of losing their mobile phone (Sar & Isiklar, 2012). This tethered state is encouraged as the single device replaces possessions such as cameras and journals, and young adults admit that their phone feels like a part of their body (Walsh, White & Young, 2008).

Gender. Researchers disagree about whether there are gender differences in mobile phone addiction. Walsh, White, Cox, & Young (2011) found that being female was associated with cell phone involvement but not cell phone use. While developing their Cell-Phone Over-Use Scale (COS), Jenaro, Flores, Gómez-Vela, González-Gil, & Caballo (2007) surveyed 337 students at a University in Spain to find that high cell-phone use is more common among women. Adolescent girls are also more vulnerable to negative symptoms of mobile phone use such as musculoskeletal pains and sleep problems (Punamaki, Wallenius, Nygard, Saarni, & Rimpela, 2007). Billieux, Van der Linden, and Rochat (2008) reported that while men are more likely to use their phones in dangerous situations, such as driving, women were more likely to develop dependence-related symptoms to cell phone use. After a survey of Japanese university students ages 18-25, Takao (2014) reported that women are more likely to score higher on the Mobile Phone Problem usage scale developed by Bianchi & Phillips (2005). However, when first

testing the scale, Bianchi & Phillips reported no differences in gender regarding problematic usage.

Personality. In addition to age and gender, problem use is also a function of personality traits, in particular those with neurotic and extraverted traits (Bianchi & Phillips, 2005; Ehrenberg, Jukes, & White, 2008; Ezoe, Toda, Yoshimura, Naritomi, & Den, 2009; Takao, 2014). Researchers have observed that neuroticism and impulsivity (personality traits associated with emotional-regulation problems) are positively related to the number of text messages sent by individuals (Butt & Phillips, 2008; Ehrenberg, Jukes, & White, 2008). Individuals who are motivated by approval and social inclusion exhibit stronger dependency on their phones (Takao, Takahasi, and Kitamura, 2009). Lee, Chang, Lin, & Cheng (2014) found that compulsive smartphone use is related to locus of control, materialism, and the need for touch. After surveying 414 university students in China, Bian and Leung (2015) reported that participants who scored higher loneliness and shyness scores were also more likely to be addicted to their cell phones. Billieux, Van der Linden, and Rochat (2008) argued that impulsivity and urgency were factors that explain dependence, supporting the role of checking behaviors in encouraging dependet. They also found that cell phone dependence could be predicted by a lack of perseverance, defined by Whiteside and Lynam (2001) as the ability to hold concentration on challenging tasks.

Upon examining these factors, it appears that any research examining cell phone use must account for these variables and how they influence the relationship between a predictor variable and problematic cell phone use. Many personality factors already reflect characteristics of a low level of differentiation of self. Therefore, a study

examining differentiation and cell phone use would need to account for age and gender and their mediating and moderating influence on the relationship.

Measuring cell phone interaction. In the literature, cell phone usage is measured by two variables: frequency and duration. Frequency is defined as the number of times a person interacted with the device, whereas duration measures the amount of time a person used their phone (Saeb et al., 2015). Walsh, White, Cox, & Young (2011) argued that distinct psychological processes highlight how often people use the device and how involved a person is with the device. In an earlier study, they described cell phone involvement as having two components: the cognitive and the behavioral (Walsh, White, & Young 2010). If a person is thinking about checking their phone or experiencing anxiety if they cannot check, this is the cognitive component. Behavioral aspects of involvement include the checking behavior and keeping the phone in close proximity (i.e., sleeping with one's phone). Because of the cognitive component, where a person is not physically engaging with the phone, the authors argue that involvement is a better and broader construct for examining the relationship between a person and the device. This understanding of involvement mirrors that of other behavioral and technological addictions (Charlton & Danforth, 2007; Orford, 2001).

While cell phone addiction has been associated with use of the device (duration and frequency), self-reporting of use has been found in the literature to be an underestimation (Lin et al., 2015). This is another reason why involvement can more accurately assess and explain the relationship between an individual and their device than is true for usage alone. In their survey of 292 Australian adolescents, Walsh, White, Cox, & Young (2011) found that a much lower variance was explained by young adults'

frequency of use, compared to a higher amount of variance attributed to involvement. Lin et al., (2015) reported that cell phone addiction is related to frequency of use more than duration of use, which supports the hypothesis that checking behaviors promote dependence. Surveying 274 smartphone users (with an average age of 27.2) using the Mobile Phone Involvement Questionnaire (Walsh, White, & Young, 2009). Harwood, Dooley, Scott, and Join (2014) found that phone involvement was associated with depressive symptoms while phone use demonstrated no such relationship.

There also exists a division in mobile phone addiction research between those who choose to focus on cell phone use that involves gathering information and others who focus on the phone as a bridge for feelings of belonging and inclusion (Mihailidis, 2014). Foerster, Roser, Schoenie, & Roosli (2015) argued that one form of problematic phone use is more accurately described as media addiction, involving dependency on online games and Internet surfing. The other form of problematic use relates to the need for interconnectivity through constant communication.

From the literature one can derive several considerations for potential future research. The first is that cell phone involvement is a much more complex and reliable measure than cell phone usage alone, which is difficult to estimate in a self-report study. The second is that cell phone involvement is probably a more reliable measure in distinguishing relationship motivations from media addiction than measures of phone usage, which cannot isolate individual behaviors, such as using an app to check the news or texting a friend for support (Saeb et al., 2015). Because smart phones allow individuals to track and log text messages, however, some measures of usage are less fallible to self-reporting error and are worth collecting as research data.

Gaps in the research. Because problematic cell phone use is such a relatively new field in the behavioral sciences and because cell phone technology is rapidly changing, a single research project cannot address all of the current gaps in the research. However, the researcher attempted to address several of the gaps observed in the research on cell phones and relationship maintenance, Bowen Theory, and problematic cell phone use as described in the literature review.

As mentioned before, no study currently examines the nature of the impact of relationship type on cell phone use. One benefit of using the Differentiation of Self Inventory (Skowron & Friedlander, 1998) as a measure is that items on the survey address both family of origin relationships (particularly parent/child relationships) and romantic relationships. Because most relationship measures rely on an individual's current estimation of their satisfaction, use of the DSI captures a better assessment of long-term relationship patterns in a system. This research also addressed the lack of diversity in studies on cell phones and relationship maintenance, by broadening its scope beyond university students and by surveying participants from multiple nationalities and age groups.

This research also addressed multiple gaps in the quantitative study of Bowen Family Systems Theory. The researcher evaluated how both age and gender relate to differentiation of self, two potentially moderating variables with little examining in past literature on Bowen Theory. As mentioned above, by broadening the research sample, the study contributed to the lack of diversity in research on the theory. It was also the first research project to attempt to examine how technology influences and is influenced by

the relationship system, and the first to examine behavioral addiction through the lens of the theory.

This dissertation also attempted to expand upon our understanding of problematic cell phone use and how it can be measured. The study expanded on the groundwork laid by researchers to use Brown's Theory as a model for problematic involvement with technology. Also because self-reporting use is often an underestimation (Cohen & Lemish, 2003), this study attempted to capture an accurate measure of use by asking participants to use their smartphone data to report the number of calls made and text messages sent. Finally, this study answered Walsh, White, and Young's (2010) call to researchers to develop interventions that encourage young people to develop broader identities than their mobile phone user personas. Because if Bowen family systems theory can explain some level of cell phone involvement, then the tools and constructs used by family systems clinicians may prove useful in addressing problematic cell phone use

Chapter 3: Methods

The following chapter will review the methodology of this research. It will review the research questions and hypotheses, sample demographics, data collection procedures, instrumentation used for the research, and data analysis procedures. Instrumentation including the Mobile Phone Involvement Questionnaire, the cell phone use survey, the Differentiation of Self-Inventory, the demographic questionnaire, and the Ten-Item Personality Inventory can be found in the Appendix of this study.

The instrumentation outlined in this chapter were used to answer the following research questions and test the following research hypotheses.

1. To what extent do age, gender, and differentiation of self predict involvement with a cell phone?
2. To what extent do age, gender, and differentiation of self predict cell phone use?
3. To what extent do age and gender moderate the relationship between differentiation of self and cell phone involvement?
4. To what extent do age and gender moderate the relationship between differentiation of self and cell phone use?
5. Does culture moderate the relationship between differentiation and self and cell phone involvement in a model also containing age and/or gender?

Research Hypotheses

The following research hypotheses were evaluated using hierarchical regression analysis. Age, gender, and differentiation of self were the predictor variables, and cell

phone involvement and cell phone use were the criterion variables. The validity of age, gender, and culture as moderating variables were also tested.

Hypotheses

1. The researcher predicts that age will be inversely related to cell phone involvement (Bianchi & Phillips, 2005; Walsh, White, Cox, & Young, 2011). The researcher also predicts that the relationship with cell phone involvement will be stronger for female participants compared to male participants (Billieux, Van der Linden, & Rochat, 2008; Walsh, White, Cox, & Young, 2011; Takao, 2014). Differentiation of self will also be inversely related to cell phone involvement, and the relationship will be strong.

2. The research predicts that age will be inversely related to cell phone use (Bianchi & Phillips, 2005; Walsh, White, Cox, & Young, 2011). The researcher also predicts that cell phone use will be relatively equal between male and female participants. Finally, differentiation of self will be inversely related to cell phone use, but the relationship will prove weak.

3. Age and gender will moderate the relationship between differentiation of self and cell phone involvement as follows: older participants' level of differentiation of self will be inversely related to cell phone involvement (Bianchi & Phillips, 2005; Walsh, White, Cox, & Young, 2011). For female participants, the relationship between differentiation of self and cell phone involvement will be strong. For male participants, the relationship between

differentiation of self will be weak (Billieux, Van der Linden, & Rochat, 2008; Walsh, White, Cox, & Young, 2011; Takao, 2014).

4. Age and gender will moderate the relationship between differentiation of self and cell phone use as follows: older participants' level of differentiation of self will be inversely related to cell phone use (Bianchi & Phillips, 2005; Walsh, White, Cox, & Young, 2011). For female participants, the relationship between differentiation of self and cell phone use will be strong; For male participants, the relationship between differentiation of self and cell phone use will be weak (Punamaki, Wallenius, Nygard, Saarni, & Rimpela, 2007; Takao, 2014).

5. There was no hypothesis regarding culture as a moderator between differentiation of self and cell phone involvement. This was an exploratory hypothesis, as there is no current additional research exploring these three variables.

Sample Demographics

This study pulled from the broad population of adult cell phone owners. In its 2015 report, the Pew Research Center listed young adults (ages 18-29) as the age cohort most likely to become smart phone dependent. Other researchers have also found that young adults are more likely to exhibit high-level and problematic use of the cell phones (Bianchi & Phillips, 2005; Walsh & White, 2006). However, rather than limiting the study to young adults, the researcher chose to extend participation to anyone age 18 and

over. Participants were required to own a cell phone in order to complete the study. Demographic characteristics gathered included age, gender identity, country of residence, highest educational level completed, occupational status, and relationship status. Exclusion criteria included not owning a cell phone, not being able to read and understand English, and not completing the measures. Response rate will be discussed later in this chapter.

Overall, the research sample was largely young, female, single, and educated. The research sample included 238 female participants and 44 male participants, with a mean age of 34.38 (SD= 12.20) years. The sample's female majority is likely due to the researcher's appeal to her own social media networks which are predominately female, and the observation that women express more interest in relationship surveys (Skowron & Schmitt, 2003). Approximately 52% of participants were single, and 40% were married. Participants had an average of 17.32 years of education (SD= 3.04), with 74% of participants having obtained the equivalent of a bachelor's degree or higher. 67% of participants resided in the United States, and international participants came from thirty other countries on six continents. 90.7% of participants resided in Western countries (the United States, Canada, Europe, and Australia). Roughly 57% of participants were employed full-time.

Table 1 and 2 provide a summary of the descriptive information gathered from the study's sample. Table 1 includes the following categories: gender, country of residence, current relationship status, highest educational level achieved, occupational status, and employment type. Table 2 includes descriptive statistics for age and number of years of education.

Table 1

Sample Demographics – Frequency

	N	%
Gender	282	
Female	238	84.4
Male	44	15.6
Country of Residence	282	
United States	189	67.0
Argentina	2	.7
Austria	2	.7
Australia	11	3.9
Belgium	1	.4
Canada	12	4.3
Chile	1	.4
China	6	2.1
Colombia	1	.4
Czech Republic	1	.4
Germany	5	1.8
Finland	1	.4
France	2	.7
Hong Kong	2	.7
Indonesia	1	.4
Ireland	1	.4
India	5	1.8
Italy	4	1.4
Mexico	1	.4
Netherlands	1	.4
New Zealand	2	.7
Panama	1	.4
Russia	1	.4
Singapore	2	.7
South Africa	1	.4
Spain	1	.4
Swaziland	1	.4
Sweden	1	.4
United Arab Emirates	1	.4
United Kingdom	18	6.4
United States Minor Outlying Islands	1	.4
Current Relationship Status	282	
Single, never married	147	52.1
Married or domestic partnership	114	40.4
Widowed	1	.4

	N	%
Divorced	16	5.7
Separated	1	.4
Highest level of school completed	282	
No school completed	2	.7
Some high school	3	1.1
High school graduate	16	5.7
Some college, no degree	35	12.4
Technical or vocational training	10	3.5
Associate's degree	7	2.5
Bachelor's degree	116	41.1
Graduate degree	93	33.0
Occupational status	282	
Employed for wages	176	62.4
Self-employed	12	4.3
Out of work and looking for work	15	5.3
Out of work but not currently looking for work	4	1.4
A homemaker	14	5.0
A student	42	14.9
Retired	11	3.9
Unable to work	8	.3
Employment type	278	
Part-time	50	18.0
Full-time	161	57.9
Not employed	67	24.1

Table 2

Mean Sample Demographics (In Years)

	N	*M*	*SD*	Range
Age	282	34.38	12.20	18-79
Total education	270	17.32	3.04	5-27

Data Collection Procedures

The researcher administered the surveys for this study through a web-based

survey during a month-long period. Initial contact was sent via snowballing technique through the following social media platforms: Twitter, Tumblr, and Facebook. In order to participate, users followed a link to the survey platform Qualtrics, where they read and agreed to an informed consent page. If they consented to participate, participants were directed to begin completing the measures, including the demographic survey, the cell phone use survey, the Differentiation of Self-Inventory, and the Mobile Phone Involvement Questionnaire, and the Ten-Item Personality Inventory. Participants were allowed to skip questions, but they were instructed in the informed consent that if they did not complete the measurements, this would void their data. No monetary incentives were offered for the study, making the study cost zero dollars.

There was little to no risk of harm for participants in this study. The researcher did not collect identifying information such as name, institution, or email address, and no sensitive subjects will be broached. Regardless, individual data was downloaded from Qualtrics and stored by the researcher in a locked drop-box file accessible only by username and password. It was not stored on any computer or in paper form.

To conduct the appropriate statistical analyses, a large number of participants were required. The researcher conducted a power analysis to determine the minimum number of participants necessary to compare the predictor variable of differentiation of self and moderating variables including age and gender in a hierarchical regression model. A minimum sample size of 168 was needed to detect moderate effect sizes (R^2 change = .05) and power (.80). For a large and diverse sample size, the researcher used convenience sampling via social media. As a mental health journalist, the researcher had access to several thousand people via social media platforms including Twitter, Tumblr,

and Facebook. There are limitations to the use of a convenience sample, such as the possibility of selection bias, the lack of generalizability, and the possibility of sampling errors. However, because this particular network includes men and women from varied ages, nationalities, and ethnicities, it provided a broader and larger sample than simply surveying American college students or undergraduate psychology majors as past literature in this area has done.

Response Rate

Because the research survey was distributed via social media and through email forwarding, the researcher cannot estimate how many people were invited to take part in the survey. However, the researcher was able to calculate that the survey link was shared by others on social media platforms such as Facebook, Twitter, and Tumblr approximately fifty times by people other than the researcher. Three hundred and thirty-four participants began to complete the survey, and the researcher determined that participants who did not submit age and gender and also completed the MPIQ, the cell phone use survey, and the Differentiation of Self Inventory would be eliminated. 52 respondents did not submit their age, which left 282 valid responses to use for the analysis. Of these 282, four did not complete the Ten-Item Personality Inventory (TIPI), but because this measure was analyzed only as a potential covariate, these responses were considered valid for analysis. There are no commonalities between participants who failed to complete the TIPI, and it is possible that participants lost interest before they reached the measure, as it was the last on the survey.

Instrumentation

Cell phone involvement. Participants completed the Mobile Phone Involvement Questionnaire (MPIQ) as a measure of the concept of smart phone involvement (Walsh, White, & Young 2010). The MPIQ is an 8-item measure that uses a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The measure was developed from the components of Brown's behavioral addiction components (1993, 1997), including withdrawal, cognitive and behavioral salience, euphoria, loss of control, relapse and reinstatement, conflict with other activities, and interpersonal conflict (Walsh, White, Cox, & Young, 2011). Items include statements such as "I often think about my mobile phone when I am not using it," and "I feel connected to others when I use my mobile phone." For a total score, ratings were summed across items, with a scoring range of 7-56. The MPIQ has demonstrated moderate reliability at α=.80 (Walsh, White, Cox & Young, 2011) and significant validity coefficients between age and cell phone involvement ($r = .21$) and between gender and cell phone involvement ($r = .12$). In the current study, the Cronbach's alpha for the MPIQ was .79.

Cell phone use. Cell phone use is defined in the literature as the frequency and duration of use. In a cell phone use survey developed for this study, participants were asked to estimate the average of the following for a single typical day: messages sent, messages received, calls sent, and calls received. Messages sent and received were divided up into the following categories to include multiple domains and social media categories: texting, Facebook, Google+, Pinterest, Reddit, Snapchat, Tumblr, Twitter, YouTube, and other platforms. Together all of these items were summed to create a scale that reflects average cell phone use frequency, and they could be used individually as the

dependent variable should the researcher wish to consider them separately in future research. This creation of an average use frequency variable follows the precedent set by Walsh, White, Cox and Young (2011), who created a scale for mobile phone use (α = .68). This scale is somewhat limiting because it does not account for duration of use. Duration of use is difficult to estimate (Cohen & Lemish, 2003), and frequency of use can easily be determined and averaged by checking text logs and calls logs on the cell phone. However, the researcher decided to also ask participants to estimate the time spent on their phone each day. This duration data may be used for future research.

Differentiation of self. Participants completed the Differentiation of Self-Inventory (Revised Version) as a measure of the concept of differentiation of self (Skowron & Schmitt, 2003). The DSI-R consists of four subscales which measure the Bowen constructs of emotional reactivity (11 items), "I" position (11 items), emotional cutoff (12 items), and fusion with others (12 items), for a total of 46 items. The DSI-R uses a 6-point Likert type scale for each item (1 being "not at all true of me") to 6 ("very true of me"). Items include statements such as "I wish that I weren't so emotional" (i.e., emotional reactivity), "I usually do not change my behavior simply to please another person" (i.e., "I" Position), "I often feel inhibited around my family" (i.e., emotional cutoff), and "I want to live up to my parents' expectations of me" (i.e., fusion with others). Overall, the measure has demonstrated high internal consistency (α_{er}= .92, α_{ip} = .92, α_{ec} = .92, and α_{fwo}=.92). The measure is also easy to read, rating a 4.7 on the Flesche-Kincaid reading scale (Knauth & Skowron, 2004).

Items on the DSI-R that demonstrate a higher level of differentiation are scored as written (i.e., "When making decisions, I seldom worry about what others will think").

Questions which demonstrate a lower level of differentiation are scored in reverse (i.e., "My self-esteem really depends on how others think of me"). To calculate a total DSI score, the items are summed and divided by 46. To calculate score for each subscale, the researcher added the results for each subscale and then divides the total by the number of items in the subscale, for a score between 1 and 6. Higher subscale scores reflect higher levels of differentiation in the individual. Scores can range between 1.0 and 6.0 for both total level of differentiation and for each subscale. In their creation of the revised inventory, Skowron and Schmitt (2003) reported the following Cronbach's alpha levels: DSI-R full scale = .92, FO = .86, ER = 39, IP = 31, EC = 34. The DSI-R in this research demonstrated high reliability for all items (α = .93) and for individual subscales, which included Emotional Reactivity (α = .86), I-Position (α = .83), Emotional Cutoff (α = .86), and Fusion with Others (α = .83).

Personality traits. Past research has found that personality is related to cell phone use and involvement (Bianchi & Phillips, 2005; Ehrenberg, Jukes, & White, 2008; Ezoe, Toda, Yoshimura, Naritomi, & Den, 2009; Takao, 2014). Therefore, the researcher considered that it might prove necessary to control for personality traits when analyzing the data for this research. Participants completed the Ten-Item Personality Inventory (TIPI), a ten-item measure of the Big Five personality dimensions (Gosling, Rentfrow, & Swann, 2003). Each item begins with the phrase "I see myself as" and is followed by a list of similar adjectives, and participants are asked to rate how they relate to the statement, on a scale of 1(disagree strongly) to 7 (agree strongly). Two of each of the ten items measure a particular personality dimension, including extraversion, agreeableness, conscientiousness, emotional stability, and openness to experiences. The mean test-retest

correlations for the personality dimensions was reported as substantial (r =.72). Reliability measures are low, with Cronbach's alpha values reported as .68, .40, .50, .73, and .45 for Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness to Experience scales respectively. Alpha values for this study were .78, -1.12, .52, .79, and, .27 for Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness to Experience scales respectively. Creators of the inventory note that the TIPI was designed in a way that creates poor alpha performance because it is devised to measure wide domains with two-items at opposite poles (Gosling, Rentfrow, & Swann, 2003). The low and negative alpha values in this sample reflect this poor performance.

In the online survey, participants provided information about their age, gender identity, country of residence, highest educational level completed, total number of years of education completed, occupational status, and relationship status. Though only age, gender identity, and country of residence were evaluated as moderating variables, the researcher examined highest educational level completed, total number of years of education completed, and occupational status to evaluate how diverse the sample size is, and the researcher used relationship status to evaluate the reliability of the Differentiation of Self-Inventory when completed by individuals who are single (Skowron & Schmitt, 2003), which had a Cronbach's alpha of .92.

Data Analysis Procedure

The main purpose of the data analysis served to evaluate whether differentiation of self could demonstrate predictive utility in the variance in cell phone use or cell phone involvement, and if age or gender moderated this relationship. Hierarchical multiple

regression was conducted with both cell phone use and cell phone involvement as separate dependent variables to answer the research questions.

The researcher began data analysis by importing data from Qualtrics to the Statistical Package for the Social Sciences version 24.0 and ensuring that the data were cleaned. Responses were evaluated for missing data, and responses that lacked age, gender identity, and a full DSI-R and MPIQ were eliminated. Then the researcher calculated Cronbach's alphas for each measure to evaluate the internal consistency of the measures. Assumptions for the data tested included the assumption of normality for each of the predictor variables. All of these assumptions were met and satisfactory. Then the researcher calculated and evaluated correlations among the predictor variables.

The researcher used hierarchical regression analysis to evaluate whether age, gender, and differentiation of self were significant predictors of cell phone involvement and use, whether the models containing these three variables were useful for explaining cell phone involvement and use, and whether age and gender are significant moderators among cell phone users. In order to test hypotheses 1 and 2, the researcher included age and gender in the model as participant characteristics in step 1. The second step added differentiation of self as the third predictor variable. Both cell phone involvement and cell phone use were tested as dependent variables in separate models. The researcher considered that should the model show no utility and differentiation of self show no value as a significant predictor of cell phone involvement or use, the researcher may substitute individual subscales of the Differentiation of Self Inventory (emotional reactivity, "I" position, emotional cutoff, or fusion with others) as a predictor variable. However, total

differentiation of self score was found to be a significant and stronger predictor than any of the individual subscales.

Next, the researcher tested hypothesis 3 and 4, adding the two interaction variables (age x differentiation of self; gender x differentiation of self) to evaluate the moderation effect within the model. In order to test for interaction effects, the researcher followed the established method (Cohen, Cohen, West, & Aiken, 2003), by centering each predictor variable by subtracting the mean value from the observed value. Then the researcher calculated the interaction terms. Finally, the researcher tested the exploratory research question by entering country of residence (culture) into the model as well as the interaction variable (country of residence x differentiation of self). Country of residence was converted into a dummy code for culture based on Western cultures and Non-western cultures.

Because there is little to no research on the relationship between differentiation of self and technology, there was no established value for what demonstrates predictive utility. The researcher decided to set a significance level for all predictor variables data analysis at .05. Therefore, if any of the four DSI subscales or the total DSI score could explain 5% of the total variance in the final stage of the regression model for cell phone use or cell phone involvement ($p < .05$), then differentiation of self could be viewed as having predictive utility in cell phone research and being a variable worth examining in future research.

Chapter 4: Results

This chapter will describe the study's results, which include data evaluation, testing of assumptions, and sample and descriptive characteristics. This chapter will also provide a description of the testing of the hypotheses.

Screening of Data

Data for this study were transferred from Qualtrics to Statistical Package for the Social Sciences (SPSS) version 24.0. The researcher examined the data and relabeled and recoded variables to prepare for intended analyses. Participants who did not submit any of the following data were considered a no response: age, gender, complete Mobile Phone Involvement Questionnaire, complete phone use survey, and complete Differentiation of Self Inventory-Revised. This reduced the survey participants from 334 participants to 282 participants, as 52 participants did not submit their age.

The researcher then began to use SPSS to compute various scores for variables, including MPIQ mean, DSI mean (and DSI subscale means), and Ten-Item Personality Inventory (TIPI) scores. Gender identity was recoded using a dummy coding scheme which labeled females as 1 and males as 2 (There were no participants who selected other gender identities). Finally, answers on the cell phone use inventory were summed to create a "cell phone use" variable. Any non-numeric answers for messages sent and received (i.e. "a lot") were counted as a non-response. For any answers including a range, the researcher used the mean of the range (i.e. "50-100" was coded as "75"). After examining answers to the final phone use survey question, "On average, how much time do you spend using your cell phone each day?", the researcher made the decision not to include this estimate in the "phone use" variable. Though duration of use is a component

of total use, researchers have reported that people struggle to accurately estimate their phone use (Cohen & Lemish, 2003; Saeb et al., 2015). Therefore, the researcher determined that frequency of use as defined by summing total messages sent and received and total calls sent and received, a definition used in previous research (Walsh, White, Cox, & Young, 2011) would provide the best estimate for cell phone use in this sample, and that phone duration potentially could be examined in future analyses of the data.

Another concern in data screening was the imbalance of gender, with 44 males and 238 females for a total of 282 participants. The results of a chi square goodness of fit test, χ^2 (1, n = 282) = 133.46, $p < .00$, revealed that participants were not equally distributed by gender, with frequencies being statistically different from what would be expected by chance when selecting from a population with an equal gender balance. However, according to the IBM Knowledge Center (2016), the default Type III sum of squares setting in the SPSS software's general linear model have the advantage by being "invariant with respect to cell frequencies as long as the general form of estimability remains constant." This setting is recommended for models that are unbalanced but contain no missing data cells, as unbalanced designs may allow more generalizability back to the population. Therefore, the researcher made the decision to keep gender as a variable in the hierarchical regression models and to not restrict the analysis to one gender.

Testing of Assumptions

To ensure variability within the sample and prepare for hierarchical regression, the researcher tested for the assumptions of prediction errors, which include normality, homoscedasticity, and independence, and for linearity between independent and

dependent variables (Cohen, Cohen, West, & Aiken, 2003). These assumptions were tested for the models with cell phone involvement as a dependent variable (in the form of the MPIQ score), and with cell phone use as a separate dependent variable.

Normality was evaluated by plotting and evaluating the residuals of each variable, each of which resembled a relatively straight line. Very small deviations were found at the ends of the plots for MPIQ score and DSI score, and the most significant departure from normality was found in the variable of total cell phone use. The researcher repeated the plotting without outliers with a score of four or more standard deviations above the mean for phone use (which included two scores: 1682, 5165). This showed an improved model, so these values were replaced with the next highest value in the new sample, which was a score of 1164. Variability among the residuals was observed as being relatively similar in a model using cell phone involvement, indicating that the sample does not violate the assumption of homoscedasticity. However, in the model using cell phone use, a casewise diagnostic found five examples of residuals farther than three standard deviations from the mean. The researcher ran the analysis without these five cases and found that individual significant values of predictor variables did not change compared to the original model. Therefore, the researcher made the decision to keep these five cases. Sample independence was verified by Durbin-Watson statistic of 1.98 (for cell phone involvement) and 1.59 (for cell phone use). The researcher tested for the assumption of multicollinearity by using collinearity diagnostic in SPSS and found that the tolerances range was .90-.99 and the variance inflation factor range was 1.00-1.03, ensuring there was no multicollinearity between variables. The data in the sample therefore met all assumptions required for hierarchical regression.

Descriptive Statistics for Variables

The descriptive statistics for predictor and criterion variables are included in Table 3. The Differentiation of Self total score mean (M=3.77, SD=.71) was comparable to the mean reported in the original development of the DSI-R (M=3.86, SD=.72), as were the subscale means and standard deviations. The means for Ten-Item Personality Inventory traits were somewhat lower when compared to the normative means reported by the creators of the survey (i.e. M=5.40 for Conscientiousness compared to 4.26 in this sample). The mean score of cell phone involvement measured by the MPIQ (M=34.12, SD= 8.57) was slightly higher than the mean reported by the creators of the questionnaire (M=28.80, SD= 9.12). Cell phone use was represented by an incredibly broad sample range (M=149.45, SD=188.22), reflecting the reality that some sample participants send and receive many messages across multiple platforms via their cell phone. Walsh, White, Cox, and Young (2011) reported an average of 31.44 messages (SD=45.44) sent and received (via text and phone call), but this original study did not survey messages sent via other social media platforms and took place before a majority of the population used smart phones (Smith, 2015).

The correlations between the predictor variables and phone involvement (MPIQ) and cell phone use are found in Table 4, with many significant correlations between variables. The MPIQ score was significantly correlated with age, gender, and the DSI total score in the directions anticipated by the researcher. Cell phone use was significantly related to age and gender as expected, but there was no significant correlation found between cell phone use and DSI-R total score.

Table 3

Descriptive Statistics: Predictor and Criterion Variables

	M	*SD*	Possible Range	Actual Range
Age	34.38	12.20	18+	18-79
DSI-R total	3.77	.71	1-6	1.57-5.83
DSI – ER	3.35	.96	1-6	1.18-5.82
DSI – IP	3.86	.83	1-6	1.64-6.00
DSI – EC	4.31	.96	1-6	1.42-6.00
DSI – FWO	3.54	.90	1-6	1.00-6.00
TIPI-E	4.15	.83	1-7	1.50-6.50
TIPI-A	4.40	.93	1-7	1.00-6.50
TIPI-C	4.26	.96	1-7	1.00-7.00
TIPI-ES	4.30	.78	1-7	1.00-6.00
TIPI-O	4.15	1.03	1-7	1.00-7.00
MPIQ	34.12	8.57	8-56	8-52
Cell phone use	149.45	188.22	0+	0-1164

Note. Ten-item Personality Inventory (TIPI) traits include Extraversion (TIPI-E), Agreeableness (TIPI-A), Conscientiousness (TIPI-C), Emotional Stability (TIPI-ES), and Openness (TIPI-O).

Table 4

Pearson Correlation Coefficients between Predictor Variables and Criterion Variables

Variable	1	2	3	4	5
1. MPIQ	__	.233**	-.287**	-.188**	-.338**
2. Cell phone use		__	-.193**	-.124*	-.087
3. Age			__	.093	.316**
4. Gender				__	.179**
5. DSI-R total					__

Note. *p<.05, **p<.01

Table five presents the correlations between each of the five personality traits measured by the Ten-Item Personality Inventory and the criterion variables. There was no significant correlation between any of the traits and MPIQ scores or phone use. Though previous research indicated some relationship between the traits of extraversion and emotional stability (previously called "neuroticism") and problematic cell phone use

(Bianchi & Phillips, 2005; Ehrenberg, Jukes, & White, 2008; Ezoe, Toda, Yoshimura, Naritomi, & Den, 2009; Takao, 2014), this relationship cannot be observed in this sample. Therefore, the researcher determined not to control for personality traits in the following analysis, eliminating its role as a covariate in hierarchical regression.

Table 5

Pearson Correlation Coefficients between Personality Traits and Criterion Variables

Variable	1	2	3	4	5	6	7
1. MPIQ	__	.233**	-.059	.053	.097	.062	-.480
2. Cell phone use		__	-.073	.055	.001	-.019	.311
3. TIPI-E			__	.006	.190**	.159**	.267**
4. TIPI-A				__	.038	.240**	.045
5. TIPI-C					__	.149*	.201**
6. TIPI-ES						__	.130*
7. TIPI-O							__

Note. *p<.05, **p<.01

Analysis of Hypotheses

Research Question 1

To what extent do age, gender, and differentiation of self predict involvement with a cell phone?

Analysis of Hypothesis 1

The researcher hypothesized that a hierarchical regression model containing age, gender, and differentiation of self would explain the most amount of variance in predicting cell phone involvement. The researcher also predicted that age would be inversely related to cell phone involvement, female participants would show a stronger

level of cell phone involvement. Finally, the researcher hypothesized that differentiation of self would be inversely and strongly related to cell phone involvement.

The results of the hierarchical regression analysis support this hypothesis in part. In the first step, age accounted for a significant amount of variance in cell phone involvement, R^2=.08, $F(1, 280)$=25.21, p<.01. For the second step, gender accounted for a small but significant amount of variance in phone involvement after controlling the variance explained by age, R^2=.11, $F(2,279)$=16.94, p<.01. For the final step, the researcher found that differentiation of self explained a significant amount of variance in cell phone involvement after controlling for the variance explained by age and gender, R^2=.17, $F(3, 278)$=18.44, p<.01. Because this contribution was higher than 5%, the researcher has determined that differentiation of self can be viewed as having predictive utility in cell phone involvement research and is a variable worth examining in future research, even though the relationship could not be categorized as "strong" as it was predicted in the first hypothesis. The results of this stepwise regression can be found in Table 6.

To analyze the direction of relationships predicted, the researcher examined the t-statistic associated with each individual predictor. These hypotheses were supported, as age was found to be negative predictor of cell phone involvement in a model with gender and differentiation of self, $t(278)$=-3.38, p<.01. Gender was found to be a significant predictor of phone involvement in a model with age and differentiation of self, $t(278)$=-2.20, p<.01, with women showing a higher level of cell phone involvement. Finally, differentiation of self was found to be a negative and significant predictor of phone involvement in a model with age and gender, $t(278)$=-4.38, p<.01.

Research Question 2

To what extent do age, gender, and differentiation of self predict cell phone use?

Analysis of Hypothesis 2

The researcher predicted that a model containing age, gender, and differentiation of self would not be able to explain a significant amount of variance in cell phone use. The researcher hypothesized that age would be inversely related to cell phone use and be able to explain a significant amount of variance. It was predicted that cell phone use would be relatively equal between male and female participants, with the variable unable to account for a significant amount of variance. Finally, the researcher predicted that differentiation of self would be inversely related to cell phone use, but the relationship would prove weak.

The results of a hierarchical regression analysis partially support this hypothesis. In the first step, age did not account for a significant amount of variance in cell phone use, R^2=.01, $F(1, 280)$=2.90, p=.09. In the second step, gender did not account for a significant amount of variance in phone use, R^2=.02, $F(2, 279)$=2.34, p=.10. thus supporting the equality of male and female usage. In the third step, differentiation of self did not explain a significant amount of variance in phone use, R^2=.02, $F(3, 278)$=1.81, p=.15. Table 7 shows the results of this stepwise model.

To analyze the direction of relationships predicted, the researcher examined the t-statistic associated with each individual predictor. Unlike the researcher hypothesized, age was not found to be significant predictor of cell phone use in a model with gender and differentiation of self, $t(278)$=-1.76, p=.08. As the researcher hypothesized, gender

was not found to be a significant predictor of phone use in a model with age and differentiation of self, $t(278)=-1.45$, $p=.15$. Finally, unlike the researcher hypothesized, differentiation of self was not found to be a significant predictor of phone use in a model with age and gender, $t(278)=.876$, $p=.38$.

Research Question 3

To what extent do age and gender moderate the relationship between differentiation of self and cell phone involvement?

Analysis of Hypothesis 3

The researcher hypothesized that age and gender would moderate the relationship between differentiation of self and cell phone involvement as follows: older participants' level of differentiation of self would be inversely related to cell phone involvement. For female participants, the relationship between differentiation of self and cell phone involvement would be strong. For male participants, the relationship between differentiation of self would be weak.

The results of the hierarchical regression do not lend support to this hypothesis. A model with mean-centered predictor variables and interaction effects explained a statistically significant proportion of variance in cell phone involvement, $R^2=.18$, $F(5, 276)=11.87$, $p<.01$. In this model, however, the interaction between age and differentiation of self did not explain a unique proportion of variance in cell phone involvement, $t(276)=-1.92$, $p=.06$. The interaction between gender and differentiation of self also did not explain a unique proportion of variance in cell phone involvement above and beyond the other predictors in the model, $t(276)=-.12$, $p=.91$.

Research Question 4

To what extent do age and gender moderate the relationship between differentiation of self and cell phone use?

Analysis of Hypothesis 4

The researcher hypothesized that age and gender would moderate the relationship between differentiation of self and cell phone use as follows: older participants' level of differentiation of self will be inversely related to cell phone use. For female participants, the relationship between differentiation of self and cell phone use will be strong; for male participants, the relationship between differentiation of self and cell phone use will be weak.

In a model with mean-centered predictor variables and interaction terms, there was no support for the hypothesis that age and gender moderate the relationship between differentiation of self and phone use. The model with interaction effects did not explain a statistically significant proportion of variance in, R^2=.14, $F(5, 276)$=1.09, p=.39. Also, the interaction between age and differentiation of self did not explain a unique proportion of variance in cell phone use $t(275)$= -.03, p=.98 The interaction between gender and differentiation of self also did not explain a unique proportion of variance in cell phone use above and beyond the other predictors in the model, $t(275)$=-.15, p=.88.

Table 6

Hierarchical Regression Analysis Showing Variance in Cell Phone Involvement Accounted for by the Predictor Variables and Interaction Terms

	R	R^2	Adjusted R^2	ΔR^2	*F* change	*df1*	*df2*	*p*
Step 1:	.29	.08	.08	.08	25.21	1	280	.00
Step 2:	.33	.11	.10	.03	8.04	1	279	.00
Step 3:	.41	.17	.16	.06	19.22	1	278	.00
Step 4:	.42	.16	.16	.01	1.85	2	276	.16

Note. Step 1: age, Step 2: gender, Step 3: DSI total, Step 4: interaction terms (age x DSI, gender x DSI) and mean-centered predictor variables.

Table 7

Hierarchical Regression Analysis Showing Variance in Cell Phone Use Accounted for by the Predictor Variables and Interaction Terms

	R	R^2	Adjusted R^2	ΔR^2	*F* change	*df1*	*df2*	*p*
Step 1:	.10	.01	.01	.01	2.90	1	280	.09
Step 2:	.13	.02	.01	.01	1.78	1	279	.18
Step 3:	.14	.02	.01	.00	.77	1	278	.38
Step 4:	.14	.02	.00	.00	.01	2	276	.99

Note. Step 1: age, Step 2: gender, Step 3: DSI total, Step 4: interaction terms (age x DSI, gender x DSI) and mean-centered predictor variables.

Exploratory Research Question

Does culture moderate the relationship between differentiation of self and cell phone involvement in a model also containing age and/or gender?

Analysis of Exploratory Hypothesis

The researcher had no hypothesis concerning culture as an individual predictor or a moderator in a model containing age, gender, and differentiation of self. This hypothesis was exploratory since there is no research examining the interaction between cell phone use or involvement, differentiation of self, and culture. A dummy code was used to create a culture variable that distinguished participants from Western countries (the United States, Canada, Europe, and Australia) and Non-western countries.

Participants from Western countries comprised 90.7% of the sample. When added as a fourth step in the model, after age, gender, and differentiation of self, there is small predictive utility for culture when added to the model, R^2=.16, $F(4, 275)$=13.52, p<.01, but not a significant increase. Also, culture did not explain a unique proportion of variance in cell phone involvement, $t(275)$=1.07, p=.29.

However, when the interaction between differentiation of self and culture was included as an additional step in the model, there was small but significant predictive utility added to the model, R^2=.18, $F(5, 274)$=11.73, p<.01, and the interaction between differentiation of self and culture explained a unique proportion of variance in cell phone involvement, $t(274)$=2.00, p=.05.

Table 8

Hierarchical Regression Results for Models Predicting Cell Phone Involvement

	Model 1				Model 2				Model3			
	B	*SE B*	β	*T*	B	*SE* B	β	*t*	B	*SE* B	β	*t*
Age	-.14	.40	-.20	-3.38**	.12	.04	.17	2.92**	.13	.04	.19	3.25**
Gender	-2.90	1.31	-.12	-2.20*	-3.04	1.40	-.13	-2.17*	-3.00	1.36	-.13	-.2.20*
DSI total	-3.08	.70	-.26	-4.39***	3.31	2.35	.28	1.41	-1.57	2.38	-.13	-.66
Age x DSI	—	—	—	—	-.10	.05	-.11	-1.92+	—	—	—	—
Gender x DSI	—	—	—	—	-.23	1.97	-.02	-.12	—	—	—	—
Culture	—	—	—	—	—	—	—	—	1.56	.05	.05	.93
Culture x DSI									4.04	.39	.39	2.00*

Note. Predictor variables are centered for Models 2 and 3.
+p<.10, *p<.05, **p<.01, ****p<.001

Table 9

Hierarchical Regression Results for Models Predicting Cell Phone Use

	Model 1				Model 2			
	B	*SE B*	β	*t*	B	*SE* B	β	*t*
Age	-3.21	1.82	-.11	-1.76*	3.21	1.87	.11	1.72*
Gender	-85.48	58.83	-.09	-1.45	-88.77	63.17	-.09	-1.41
DSI total	27.55	31.45	.06	.88	-12.29	105.76	-.03	-.12
Age x DSI	—	—	—	—	.08	2.42	.00	.03
Gender x DSI	—	—	—	—	-13.42	88.95	-.03	-.15

Note. Predictor variables are centered for Model 2.
+p<.10, *p<.05, **p<.01, ****p<.001

Chapter 5: Discussion

The purpose of this research was to evaluate the predictive relationship between age, gender, and differentiation of self and an individual's cell phone involvement and cell phone use. Data were collected via an online, self-report survey with 282 respondents completing all necessary items. Separate hierarchical regression models exploring whether age, gender, and differentiation of self predicted both cell phone involvement and cell phone use were tested for their significance. Age and gender were tested as potential moderators for differentiation of self and cell phone involvement and use, and culture was tested as an individual predictor and potential moderator. Results indicated that age, gender, and differentiation of self were small but significant individual predictors of cell phone involvement but not cell phone use. Age and gender did not moderate the relationship between differentiation of self and cell phone involvement.

This final chapter will present the findings of the study as they relate to existing literature on cell phone dependence. The researcher will also discuss the limitations of the research, suggestions for future studies, and the implications of the findings for the field of counseling. Based on the researcher's knowledge, no other studies to date have examined the relationship between differentiation of self and cell phone dependence.

Major Findings

Cell phone involvement. Participants in this study had a higher rate of phone involvement (M=34.12, SD=8.57) measured by the Mobile Phone Involvement Questionnaire than the mean reported (M=28.80, SD=9.12) by the creators of the questionnaire (Walsh, White, Cox, & Young, 2011). However, it's important to consider fewer than 35% of Americans owned a smart phone in 2011, so it is possible that

increased use of a cell phone for day-to-day functioning would led to overall increased involvement in the past five years, with more than two-thirds of the population owning a smart phone (Smith, 2015). Other researchers employing the MPIQ in recent years have also reported higher mean scores when compared to the original reports (Rupani et al., 2016). The researcher also found that relationship status, number of years of education, and employment status were not significantly related to cell phone involvement. None of the Big Five personality traits measured by the Ten-Items Personality Inventory (Goslin, Rentfrow, & Swann, 2003) were significantly related to cell phone involvement, and therefore the researcher decided to exclude this measure as a potential covariate.

In this sample, the highest item mean score (M=5.33, SD=1.37) was for the MPIQ statement which read, "I feel connected to others when I use my cell phone." Because this group of participants largely identified their cell phone as a connecting tool, this observation lends support that cell phone involvement is a topic worthy of examining when studying an individual's functioning within the relationship system. It also indicates that the study's participants potentially viewed their cell phone involvement as potentially more positive in nature because it provides social support. An alternative explanation, however, is that this increased connection could reflect the presence of emotional fusion in relationships for those more involved with their phones, as users feel tethered to family, friends, and work and the positives and negatives of what Hall and Baym described as the "double-edged sword" (2012). It is also possible that this increased scored on the connection item reflects the ability to observe and communicate with others via social media on a smart phone.

The second highest mean score was for the item which read, "I often use my cell phone for no particular reason" (M=5.10, SD=1.69). This result possibly reflects the common symptom of problematic cell phone use known as the "checking habit" (Oulasvirta, Rattenbury, Ma, & Raita, 2012), an automatic behavior of unlocking or opening a phone to look for new content or responses to interactions. This paradox of using a cell phone to connect but also using it for no particular reason raises interesting questions. Perhaps cell phone users reach out to contact people because they are caught in this problem behavior of checking, and text and social media responses from others reinforce this habit. The result may be feeling connected to others, even though that was not the original intention of the act of engaging with the cell phone. The lowest mean was for the item which read, "Arguments have arisen with others because of my cell phone use" (M=3.02, SD=1.88), indicating that interpersonal conflict may not always be a major indicator of cell phone involvement, but the large standard deviation for the item indicates the variability of this experience.

Cell phone use. Because this study did not employ direct tracking of frequency and duration of use, cell phone use remains a difficult variable to estimate or measure (Cohen & Lemish, 2003; Saeb et al., 2015). In this study, cell phone use was measured by total messages (via social media and text) and calls sent and received in a single day. The researcher found that relationship status, number of years of education, and employment status were not significantly related to cell phone use. In addition, none of the Big Five personality traits measured by the Ten-Items Personality Inventory (Goslin, Rentfrow, & Swann, 2003) were significantly related to cell phone use, contradicting

previous research which found that emotional stability was negatively related to the number of text messages sent (Butt & Phillips, 2008; Ehrenberg, Jukes & White, 2008).

This sample presented an incredibly broad range for the variable of cell phone use, with some participants reporting an average of close to zero cell phone use and others reporting that they sent and received over a thousand messages each day via texting and multiple social media platforms. Cell phone use results in this study represented the most significant departure from the assumption of normality, with several scores surpassing more than four standard deviations above the mean. It is difficult to assess whether these responses are accurate or are gross over- or under-estimations of cell phone use.

When they first used message and call sums to create this variable, Walsh, White, Cox, and Young (2011) reported an average of 31.44 texts and calls sent and received each day. In this sample, participants reported an average of 64.14 (SD=97.63) texts and calls sent and received each day. However, cell phone use in this research also added messages sent and received on social media, for a total average of 149.95 (SD= 188.22). Why Walsh, White, Cox, & Young chose to not include social media messaging as a factor in cell phone use was not described in their research, but the lack of a majority of smart phone users in 2011 may have contributed to this decision (Smith, 2015). The average of 57.80 (SD=94.92) texts messages sent and received in the sample is comparable to recent reports that adults ages 25-34 send and receive 75 texts per day (Experian Marketing Services, 2013). Because no other known studies have created a cell phone use variable that includes messages received and sent on social media, it cannot be determined whether social media messaging reported by participants is typical. Reply

norms can be different for text messaging and social media messages, and aggregating them might lose the power of this distinction. However, it is possible that social media messages sent and received do reflect an individual's desire for validation from others, a trait of persons with low levels of differentiation who lack more adaptable ways of coping. Future research could benefit from deciphering messages sent for validation and those with more practical purpose (work, gathering information, etc.).

The researcher's decision to omit participants' estimation of their cell phone duration of use as a component in the cell phone use variable was a difficult one, but given the reality that people tend to underestimate their cell phone use (Lin et al., 2015), and that Walsh, White, Cox and Young (2010) omitted cell phone duration in their creation of a cell phone use variable, the researcher decided to focus on messages and calls sent and received, as participants would have access to texts and call data should they wish to check their phone during the survey. Participant responses to the question, "On average, how much time do you spend using your cell phone each day?" ranged from several minutes a day to eighteen hours of phone use a day, and again it is impossible to assess whether these responses are overestimations and underestimations. Also, by defining cell phone use by messages and calls sent and received, this sum created a variable that captured connectivity with others, which can possibly provide better insight into the role of cell phone use in the relationship system. Alternative explanations, however, include the reality that messages sent and received may be related to work or other responsibilities or contact with acquaintances with whom the user has little to no in-person relationship. Future research might benefit from isolating messages sent and received to significant players in a relationship system, such as family, close

friends, and romantic partners. A researcher might choose to evaluate messages and calls within a nuclear family or ask a user to rank their five closest contacts and examine message content and frequency.

Differentiation of self. In this research, both the differentiation of self total score mean and subscale means were similar to those reported in the development of the Differentiation of Self Inventory – Revised (Skowron & Schmitt, 2003). There was no significant relationship between differentiation of self and number of years of education, employment status, or culture. In this sample, married people tended to score higher on total DSI score (M=3.90, SD=.70) compared to single people (M=3.60, SD=.68), whereas Skowron and Schmitt (2003) observed no significant differences based on marital status. In the development of the revised DSI, the researchers also had a gender imbalance in their sample population, with a much larger majority of women participating. They noted that women have a tendency to express more interest in relationship surveys, which may also contribute to the gender imbalance in the current research.

What is perhaps most interesting is that all four subscales on the DSI-R proved significantly and inversely related to cell phone involvement. Given this result, the researcher chose to focus on total DSI score (which had the highest inverse correlation with cell phone involvement) as a predictor variable in the models. The strongest correlation among the subscales with cell phone involvement was the Fusion with Others subscale. Skowron and Schmitt (2003) define fusion with others as the characteristic of seeking approval and recognition above firmly held convictions or beliefs (Bowen, 1976). When young people turn to their phones for approval and validation, they are more likely to engage in problematic use (Walsh, White, & Young 2010). Therefore, it is

possible that an individual with a higher level of fusion with others, particularly in this sample that is predominantly composed of single people, would be dependent on his or her cell phone to find approval and recognition. This correlation with the Fusion subscale also reflects the observation that that highest individual mean on the Mobile Phone Involvement Questionnaire was the item which read, "I feel connected to others when I use my cell phone." The smallest correlation among the subscales with cell phone involvement was the Emotional Cutoff subscale, possibly further indicating that individuals use cell phone as a tool for connecting rather than emotionally distancing themselves from others. An alternative explanation is that a majority of Cutoff scale questions are about partnership or marriage, and the majority of the participants in this study were single.

Model 1A: Age, gender, and differentiation of self as predictors of cell phone involvement. Based on initial models, the results of this research indicate that age, gender, and differentiation of self explain significant variance in cell phone involvement. The hypotheses that age would be inversely related to cell phone involvement and female participants would show a stronger level of cell phone involvement were both supported and were in line with previous research (Bianchi & Phillips, 2005; Walsh, White, Cox, & Young, 2011; Takao, 2014). The hypothesis that differentiation of self would be inversely and strongly related to cell phone involvement was also partially supported, as the variables were inversely and significiantly related though not strongly related. This reflects the hypothesis that individuals with a high level of differentiation of self have more flexibility in coping with stress and therefore are less susceptible to fall into checking habits and other phone behaviors that promote dependence. Individually and

together, these three predictor variables contributed a small but significant amount of variance to cell phone involvement. Because there is no other research exploring the relationship between differentiation of self and problematic phone use, and because differentiation of self explained more than 5% of unique variance in the model, the researcher concluded that it is a construct worthy of future examination in cell phone research.

Although hierarchical regression cannot establish a causal relationship, these results hint that constructs found in Bowen theory that involve functioning in interpersonal relationships and the intrapsychic management of self may impact a person's dependence on their cell phone or be observed by examining how a person thinks about and behaves with a cell phone. In research, more differentiated individuals exhibit greater psychosocial maturity and adjustment, better problem-solving skills, and fewer problem behaviors (Gavazzi, Anderson, & Sabatelli, 1993; Murdock and Gore, 2004; Skowron, 2000). They also have more adaptive strategies for coping, demonstrating more reflective styles of reaction to stress than reactive and suppressive methods (Murdock and Gore, 2004). Therefore, it is possible that individuals with lower levels of differentiation who lack additional coping skills for stress may turn to their cell phone as a solution. They may use their phone to seek approval or recognition through social media, to self-soothe when reactive, to maintain emotional distance via texting, or to respond to pressures to accommodate their partner's demands for contact. Each of these cell phone behaviors reflect the intrapersonal and interpersonal lack of differentiation. It is also possible that cell phone dependence is just one among many

forms of behavioral addiction that individuals with lower levels of differentiation may use to cope with chronic or acute anxiety.

Model 1B: Age, gender, and differentiation of self as predictors of cell phone use. Based on initial models, the results of this research indicate that age, gender, and differentiation of self do not explain significant variance in cell phone use. The hypothesis that age would explain a significant amount of variance in cell phone use was not supported. This contradicts previous research which found that age was significantly related to frequency of cell phone use (Walsh, Walsh, Cox, & Young, 2011; Bianchi & Phillips, 2005). The hypothesis that gender would be unable to account for a significant amount of variance in cell phone use was supported. This finding supports previous research which found no significant relationship between gender and cell phone use (Walsh, Walsh, Cox, & Young, 2011; Bianchi & Phillips, 2005). Finally, the hypothesis that there would be a weak relationship between differentiation of self and cell phone use was disproven, as there was a nonsignificant relationship between the two variables. Overall, this model was proven to have no value in explaining variance in cell phone use. There is a possibility that these results also reflect measurement error in operationalizing the term "cell phone use" and limiting it to messages sent and received via a limited group of applications, or use estimation error on the part of the participants.

Based on these results, one can assume that interpersonal functioning and intrapsychic management of self as measured by the Differentiation of Self Inventory - Revised have little relationship with cell phone use (as measured by the number of messages and calls both sent and received). These findings support that cell phone use is a poor measure for behavioral dependence, as there might be multiple confounding

factors which explain frequency of cell phone use (Tossel, Kortum, Shepard, Rahmati, & Zhong, 2015), such as using a cell phone to send work messages or having a larger social network. Also, cell phone use as a measure cannot capture other cognitive and behavioral aspects of dependence, such as thinking about a phone, keeping it close, or experiencing distress when you cannot access it (Walsh, White, & Young, 2010).

Model 2: Moderation effects. In the second set of hierarchical regression models, the results revealed that age and gender did not act as significant moderators between differentiation of self and cell phone involvement. The researcher's hypothesis that older participants' level of differentiation of self would be inversely related to cell phone involvement was not supported, as the interaction between age and differentiation of self was not significant. The researcher hypothesized that the relationship between differentiation of self and cell phone involvement would be strong for female participants and weak for male participants was also not supported, as the interaction between gender and differentiation of self was not significant.

From these results, one can assume that differentiation of self possibly has a significant impact on the level of cell phone involvement regardless of how old a person is. This confirms previous research that suggest that young people are equally able to define themselves among others and remain thoughtful in the presence of anxiety as older adults (Skowron, Wester, & Azen, 2004; Skowron, 2004). However, the lack of a significant interaction between age and gender contradicts earlier research, which found that women scored lowered on the Emotional Reactivity (ER) subscale and the I-Position (IP) subscale (Rodriguez-Gonzalez, Skowron, & Anchia, 2015; Skowron & Schmitt, 2003). These results may reflect the imbalance in gender among participants or the fact

that previous studies had a higher percentage of participants who were married. Single participants considering how they might act in a relationship may score very differently on the DSI-R than those in a marriage or domestic partnership.

When age and gender were tested as potential moderates between differentiation of self and cell phone use, they were also found to be nonsignificant. The researcher's hypothesis that older participants' level of differentiation of self would be inversely related to cell phone use was not supported, as the interaction between age and differentiation of self was not significant. The researcher's hypothesis that the relationship between differentiation of self and cell phone use would be strong for female participants and weak for male participants was not supported, as the interaction between gender and differentiation of self was not significant, furthering confirming that cell phone involvement is a better measure for exploring the construct of differentiation of self. These results are difficult to interpret given the lack of predictive utility of differentiation of self in a cell phone use model without the interaction effects. It does however, lend insight that a lack of differentiation can manifest itself in many ways, regardless of age or gender. Intrapersonal fusion and/or a high level of reactivity in both men and women does not imply that there is significant phone use. Therefore, a clinician would err to generalize about a person's level of differentiation of self based on how much an individual uses their phone.

Model 3: The impact of culture. The results of this study suggest that culture may be a variable to consider in order to explain some variance in cell phone involvement. Though the predictor added a very small amount of utility to a model with age, gender, and differentiation of self, individually culture did not contribute to variance

in cell phone involvement. However, the interaction between culture and differentiation of self was found to be significantly related to cell phone involvement, indicating its usefulness as a potential moderating variable between differentiation of self and cell phone involvement. Aside from this research, there has been no current testing of the Mobile Phone Inventory Questionnaire across cultures in a single study. The MPIQ, however, has been used in various countries, including Australia, Taiwan, and the United Kingdom (Walsh, White, Cox, & Young, 2011; Lin et al., 2015, & Harwood, Dooley, Scott, & Join, 2014).

To date, there is a small amount of research that supports the assertion that differentiation of self is a relevant concept across cultures and that the DSI-R accurately measures differentiation across cultures. Skowron and Schmitt (2003) found no significant relationship between ethnicity and differentiation of self, but these were all American subjects. In 2000, Tuason and Friedlander found no differences between a sample group from the Philippines and the original American scores on the DSI, but they did not provide a control by using their own American sample group. One study in South Korea reported a relationship between higher differentiation of self and healthy family functioning (Chung & Gale, 2009). Another found that the DSI-R was valid in both American and South Korean cultures in predicting healthy family functioning and family communication, with the researchers asserting that the DSI-R was a culturally-friendly measure (Kim, Prouty, Smith, Ko, Wetchler, & Oh, 2014). More research, however, is needed to assess the applicability of the construct of differentiation of self as well as the usefulness of the DSI-R across various cultures especially when attempting to discern the relationship between a differentiated self and the use of smart phones.

Limitations

This study is a strong contribution to research on differentiation and cell phone dependence for several reasons. Based on the researcher's knowledge, it is the first study exploring the relationship between behavioral involvement with smart phones and differentiation of self. It also provides a diverse sample of a broad range of ages and nationalities, whereas most studies on cell phone dependence recruit young adult participants from a single country and in a university setting. It is also the first research study which incorporates social media messaging into a measure of cell phone use in addition to calls and texts, capturing more of smart phone functioning as it relates to communication.

The major limitations in this study stem from the sampling procedure. Because the sample was comprised of non-random volunteers from the researcher's social media network, there is the possibility of unidentified selection bias and decreased external validity. Because participants were targeted via social media, it is possible that a biased sample of active online users was selected. Also, because participants are overwhelmingly female, young, single, and educated, the results of the study may be less generalizable to the overall population of cell phone users. Also, because there is no way to measure how many people viewed the survey in total, it is impossible to know why some individuals were motivated to participate and others were not. It is also impossible to know why some participants chose to not complete the surveys or omit certain information. In addition, the length of the surveys may have led to participants answering items hastily or untruthfully. Finally, there is no way to confirm the ability to read and understand English for participants.

The demographics of the sample also could have impacted the results and validity of the study. For example, though there was enough statistical power to analyze differences in gender, the lack of male participants could have impacted the results of the models. Also, because 52% of participants had never been married or in a domestic partnership, many of the items on the Differentiation of Self Inventory were items which may not reflect the reality of a relationship but their "best guess" about how they would act in a relationship.

When deciding to explore phone dependence and use via quantitative analysis, there are unavoidable limitations. Regression cannot establish causality, so the researcher is unable to establish that working on one's level of differentiation of self would have any impact on cell phone dependence. Also, the measure of cell phone involvement via the MPIQ is limited because it is not context specific or context sensitive but rather is a measure of the participant's present state of involvement. The measure provides no instruction as to whether the participant is answering with respect to their thoughts about phone use in recent memory or more generally over time, and it doesn't distinguish between cell phone use during stressful times or calmer ones. This study also was unable to capture the particular interactions of phone use that might highlight connections between technology and differentiation of self. More descriptive research could capture the nuances of cell phone use and how they relate to the relationship system. Also, this study cannot interpret whether a person actually checked their cell phone to gather a close estimate of messages sent and received, or whether they simply guessed about their cell phone use habits. It is also possible that people underestimated their cell phone use because of a social desirability bias (Cohen & Lemish, 2003; Saeb et al., 2015), or that

they were using current use as a reference which was not representative of their average use over time. In addition, by only examining the degree of involvement and cell phone use such as sending messages and calling, the data does not capture with whom an individual is communicating or what other features of their phone they are accessing, two components that might provide further insight into the nature of smart phone behaviors. Finally, because the Mobile Phone Involvement Questionnaire was developed without reference to smart phones, this measure may fail to capture changes in dependence since the advent of this technology.

Suggestions for Future Research

Limitations in the study provide helpful guidelines and suggestions for future research. For example, a researcher conducting a descriptive qualitative study and interviewing people about their phone use within the relationship system could uncover greater insight into the relationship between technology and differentiation of self. This would address the difficulty in interpreting what usage actually means to participants. A researcher could ask people details about whom they're contacting, the spoken and unspoken rules of cell phone communication, and what events or emotions might prompt phone dependence. Also qualitative research could capture the difference between cell phone messages (i.e., a short reply sent to an online acquaintance vs. an emotional text or call to a family member), as cell phone communication between family members or romantic partners may be important to distinguish and examine. Researchers could also examine the context of usage, such as when messaging is helpful, when it represents conflict, and how it relates to the amount of stress or acute anxiety in an environment.

Future research could also include technological applications which allow for exact measurement of cell phone use. This would prevent reporting errors and provide an accurate picture of cell phone use in the form of frequency (i.e., how many times a person unlocks their cell phone) and duration (i.e. how long a person spends on the Internet on their phone). It could also capture others types of smart phone use such as internet surfing, playing games, and checking email.

Perhaps the next missing link in research on differentiation of self and cell phone use is the role of anxiety. Because differentiation of self has been proven to mediate the relationship between chronic anxiety and the development of symptoms in adolescent population (Knauth & Skowron, 2004), it is possible that it can serve as a mediator between chronic anxiety and problematic cell phone behaviors. Observing whether differentiation of self was a preventative factor for problematic cell phone use in times of stress could provide valuable insight into the importance of working on interpersonal relationships and intrapsychic functioning to prevent behaviors such as cell phone dependence.

Based on the researcher's knowledge, this study is the first to combine the frameworks of Bowen theory and Brown's theory of behavioral addiction. Both theories are in need of additional quantitative testing of their qualitative constructs, and future research could also explore how differentiation of self is related to other problem behaviors in addition to cell phone involvement, such as compulsive gambling, sexual addiction, problematic internet use (PIU), and video game addiction. If Bowen-trained clinicians wish to assert that working on defining oneself in the relationship system is an

evidence-based intervention, then researchers must explore the potentially preventative effect of a higher levels of differentiation in regards to behavioral dependence.

Implications for Counseling

The results of this study have multiple implications for the field of counseling research and applications for the counseling room. The first is that both counselors and their clients could benefit from using measures about technology use, specifically cell phone use and involvement, to gain further insight into the client's functioning. Because young people are more likely to demonstrate cell phone dependence, it is a worthy conversation when addressing their relationship system or online life. For example, counselors could explore with their clients when or how their cell phone provides positive coping support and when it is a sign they are anxiously or emotionally reacting to the world around them.

For counselors using Bowen theory or exploring interpersonal functioning and the intrapsychic management of self, the study has several implications. To start, how a person thinks about and uses their cell phone can serve as another important marker for observing emotional reactivity, emotional cutoff, fusion with others, and their overall level of differentiation. Though Bowen purported that the level of differentiation of self is relatively established by early adulthood, he acknowledged that differentiation could increase if the individual took steps to manage anxiety within the emotional family unit and to adapt to the events of life, both good and bad (Bowen, 1978). Whereas typically a client must rely on self-report to generate examples of progress or challenges in these areas, within their cell phone they have a written record of how they chose to respond, avoid, create emotional triangles, function for others, and underfunction in their

relationship system. Counselors would then be able to use snippets of these text or social media conversations as concrete examples of when an individual was emotionally reactive and when they chose to define themselves to others and remain thoughtful in the presence of anxiety. Also, designers of instruments that measure Bowen theory concepts could consider how to incorporate questions about technology use in their design.

Summary and Conclusions

This dissertation is an important first step in answering Walsh, White, and Young's (2010) call to researchers and clinicians to develop interventions that encourage young people to develop broader identities than their cell phone personas. By demonstrating that higher levels of differentiation of self are related to decreased cell phone involvement, this research begins to build a path for the tools and constructs used by family systems clinicians to address cell phone dependence, particularly among young adults.

In this research, age, gender, and differentiation of self were found to be unique predictors of cell phone involvement but not cell phone use. Age was found to be negatively related to cell phone involvement, and women were found to exhibit more significant involvement with their cell phones. But above and beyond these demographic factors, there was strong evidence found that differentiation of self is a significant negative predictor of cell phone involvement, and that age and gender do not significantly moderate this relationship. Finally, there was small but significant evidence that culture may moderate the relationship between differentiation of self and cell phone involvement.

Despite the paucity of research on the relationship between behavioral addiction and differentiation of self as well as the limitations of this research, it is evident that exploring cell phone dependence in the counseling room can provide insight into interpersonal functioning and intrapsychic management of self. By continuing this research, both counselors and counseling researchers can help others maturely navigate the ever-expanding realm of communication technology that knits us together.

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Appendix A: Electronic Informed Consent

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Online Consent and Instructions

You are invited to take part in a research survey about cell phone use and involvement. Your participation will require approximately 20 minutes and is completed online. There are no known risks associated with this survey. Benefits may include gaining more insight into how and when you think about and use your cell phone.

To participate in this study you must:

1) Be 18 years of age or older
2) Own a cell phone
3) Read and understand English

Taking part in this study is completely voluntary. If you choose to be in the study you can withdraw at any time and your answers will be discarded. Your responses will be kept strictly confidential, and digital data will be stored in secure computer files. Any report of this research that is made available to the public will not include any individual information by which you could be identified.

If you have questions or want a copy or summary of this study's results, you can contact the researcher at the email address above. If you have any questions about whether you have been treated in an illegal or unethical way, contact the George Washington University Office of Human Research at 202-994-2715 or ohrirb@gwu.edu. Please feel free to print a copy of this consent page to keep for your records.

Clicking the "Yes" button below indicates that you are 18 years of age or older, own a cell phone, read and understand English. It also indicates your consent to participate in this survey.

Do you consent to participate in this survey?

- o Yes
- o No

Appendix B: Differentiation of Self Inventory-Revised
(DSI-R, Skowron & Schmitt, 2003)

These are questions concerning your thoughts and feelings about yourself and relationships with others. Please read each statement carefully and decide how much the statement is generally true of you on a 1 (not at all) to 6 (very) scale. If you believe that an item does not pertain to you (e.g., you are not currently married or in a committed relationship, or one or both of your parents are deceased), please answer the item according to your best guess about what your thoughts and feelings would be in that situation. Be sure to answer every item and try to be as honest and accurate as possible in your responses.

1. People have remarked that I'm overly emotional.

Not at all true of me Very true of me

1 2 3 4 5 6

2. I have difficulty expressing my feelings to people I care for.

Not at all true of me Very true of me

1 2 3 4 5 6

3. I often feel inhibited around my family.

Not at all true of me Very true of me

1 2 3 4 5 6

4. I tend to remain pretty calm even under stress.

Not at all true of me Very true of me

1 2 3 4 5 6

5. I usually need a lot of encouragement from others when starting a big job or task.

Not at all true of me Very true of me

1 2 3 4 5 6

6. When someone close to me disappoints me, I withdraw from him/her for a time.

Not at all true of me Very true of me

1 2 3 4 5 6

7. No matter what happens in my life, I know that I'll never lose my sense of who I am.

Not at all true of me Very true of me

1 2 3 4 5 6

8. I tend to distance myself when people get too close to me.

Not at all true of me Very true of me

1 2 3 4 5 6

9. I want to live up to my parents' expectations of me.

Not at all true of me Very true of me

1 2 3 4 5 6

10. I wish that I weren't so emotional.

Not at all true of me Very true of me

1 2 3 4 5 6

11. I usually do not change my behavior simply to please another person.

Not at all true of me Very true of me

1 2 3 4 5 6

12. My spouse/partner could not tolerate it if I were to express to him/her my true

feelings about some things.

Not at all true of me Very true of me

1 2 3 4 5 6

13. When my spouse/partner criticizes me, it bothers me for days.

Not at all true of me Very true of me

1 2 3 4 5 6

14. At times my feelings get the best of me and I have trouble thinking clearly.

Not at all true of me Very true of me

1 2 3 4 5 6

15. When I am having an argument with someone, I can separate my thoughts about the issue from my feelings about the person.

Not at all true of me Very true of me

1 2 3 4 5 6

16. I'm often uncomfortable when people get too close to me.

Not at all true of me Very true of me

1 2 3 4 5 6

17. I feel a need for approval from virtually everyone in my life.

Not at all true of me Very true of me

1 2 3 4 5 6

18. At times I feel as if I'm riding an emotional roller–coaster.

Not at all true of me Very true of me

1 2 3 4 5 6

19. There's no point in getting upset about things I cannot change.

Not at all true of me Very true of me

1 2 3 4 5 6

20. I'm concerned about losing my independence in intimate relationships.

Not at all true of me Very true of me

1 2 3 4 5 6

21. I'm overly sensitive to criticism.

Not at all true of me Very true of me

1 2 3 4 5 6

22. I try to live up to my parents' expectations.

Not at all true of me Very true of me

1 2 3 4 5 6

23. I'm fairly self-accepting.

Not at all true of me Very true of me

1 2 3 4 5 6

24. I often feel that my spouse/partner wants too much from me.

Not at all true of me Very true of me

1 2 3 4 5 6

25. I often agree with others just to appease them.

Not at all true of me Very true of me

1 2 3 4 5 6

26. If I have had an argument with my spouse/partner, I tend to think about it all day.

Not at all true of me Very true of me

1 2 3 4 5 6

27. I am able to say "no" to others even when I feel pressured by them.

Not at all true of me Very true of m

1 2 3 4 5 6

28. When one of my relationships becomes very intense, I feel the urge to run away from it.

Not at all true of me Very true of me

1 2 3 4 5 6

29. Arguments with my parent(s) or sibling(s) can still make me feel awful.

Not at all true of me Very true of me

1 2 3 4 5 6

30. If someone is upset with me, I can't seem to let it go easily.

Not at all true of me Very true of me

1 2 3 4 5 6

31. I'm less concerned that others approve of me than I am in doing what I think is right.

Not at all true of me Very true of me

1 2 3 4 5 6

32. I would never consider turning to any of my family members for emotional support.

Not at all true of me Very true of me

1 2 3 4 5 6

33. I often feel unsure when others are not around to help me make a decision.

Not at all true of me Very true of me

1 2 3 4 5 6

34. I'm very sensitive to being hurt by others.

Not at all true of me Very true of me

1 2 3 4 5 6

35. My self-esteem really depends on how others think of me.

Not at all true of me Very true of me

1 2 3 4 5 6

36. When I'm with my spouse/partner, I often feel smothered.

Not at all true of me Very true of me

1 2 3 4 5 6

37. When making decisions, I seldom worry about what others will think.

Not at all true of me Very true of me

1 2 3 4 5 6

38. I often wonder about the kind of impression I create.

Not at all true of me Very true of me

1 2 3 4 5 6

39. When things go wrong, talking about them usually makes it worse.

Not at all true of me Very true of me

1 2 3 4 5 6

40. I feel things more intensely than others do.

Not at all true of me Very true of me

1 2 3 4 5 6

41. I usually do what I believe is right regardless of what others say.

Not at all true of me Very true of me

1 2 3 4 5 6

42. Our relationship might be better if my spouse/partner would give me the space I need.

Not at all true of me Very true of me

1 2 3 4 5 6

43. I tend to feel pretty stable under stress.

Not at all true of me Very true of me

1 2 3 4 5 6

44. Sometimes I feel sick after arguing with my spouse/partner.

Not at all true of me Very true of me

1 2 3 4 5 6

45. I feel it's important to hear my parents' opinions before making decisions.

Not at all true of me Very true of me

1 2 3 4 5 6

46. I worry about people close to me getting sick, hurt, or upset.

Not at all true of me Very true of me

1 2 3 4 5 6

Appendix C: Ten-Item Personality Inventory
(TIPI; Gosling, Rentfrow, & Swann, 2003)

Here are a number of personality traits that may or may not apply to you. Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

Disagree Strongly	Disagree moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree strongly
1	2	3	4	5	6	7

I see myself as:

1. _____ Extraverted, enthusiastic.
2. _____ Critical, quarrelsome.
3. _____ Dependable, self-disciplined.
4. _____ Anxious, easily upset.
5. _____ Open to new experiences, complex.
6. _____ Reserved, quiet.
7. _____ Sympathetic, warm.
8. _____ Disorganized, careless.
9. _____ Calm, emotionally stable.
10. _____ Conventional, uncreative.

Appendix D: Mobile Phone Involvement Questionnaire
(MPIQ; Walsh, White, & Young 2010)

1. I often think about my cell phone when I am not using it.

____ Strongly disagree
____ Disagree
____ Somewhat disagree
____ Neither agree or disagree
____ Somewhat agree
____ Agree
____ Strongly agree

2. I often use my cell phone for no particular reason.

____ Strongly disagree
____ Disagree
____ Somewhat disagree
____ Neither agree or disagree
____ Somewhat agree
____ Agree
____ Strongly agree

3. Arguments have arisen with others because of my cell phone use.

____ Strongly disagree
____ Disagree
____ Somewhat disagree
____ Neither agree or disagree
____ Somewhat agree
____ Agree
____ Strongly agree

4. I interrupt whatever else I am doing when I am contacted on my cell phone.

____ Strongly disagree
____ Disagree
____ Somewhat disagree
____ Neither agree or disagree
____ Somewhat agree
____ Agree
____ Strongly agree

5. I feel connected to others when I use my cell phone.

____ Strongly disagree

____ Disagree
____ Somewhat disagree
____ Neither agree or disagree
____ Somewhat agree
____ Agree
____ Strongly agree

6. I lose track of how much I am using my cell phone.

____ Strongly disagree
____ Disagree
____ Somewhat disagree
____ Neither agree or disagree
____ Somewhat agree
____ Agree
____ Strongly agree

7. The thought of being without my cell phone makes me feel distressed.

____ Strongly disagree
____ Disagree
____ Somewhat disagree
____ Neither agree or disagree
____ Somewhat agree
____ Agree
____ Strongly agree

8. I have been unable to reduce my cell phone use.

____ Strongly disagree
____ Disagree
____ Somewhat disagree
____ Neither agree or disagree
____ Somewhat agree
____ Agree
____ Strongly agree

Appendix E: Cell Phone Use Survey

1. On average, how many messages do you **send** and **receive** to other individuals via the following **on your cell phone** every day? Messages can be private or public (i.e. a Twitter direct message or a tweet both count), but do not include posts not directed toward a particular individual (i.e. posting an Instagram photo) or messages not sent on your phone (i.e. via computer, tablet, etc.)

	Messages sent	Messages received
Text	_____	_____
Facebook	_____	_____
Google+	_____	_____
Pinterest	_____	_____
Reddit	_____	_____
Snapchat	_____	_____
Tumblr	_____	_____
Twitter	_____	_____
YouTube	_____	_____
Other platforms:	_____	_____

2. On average, how many cell phone calls do you make in a day? _____

3. On average, how many cell phone calls do you receive in a day? _____

4. On average, how much time do you spend using your cell phone each day? _____

Appendix F: Demographic Questionnaire

1. What is your age? [text box]

2. What is your gender identity? Check all that apply.

- Female
- Male
- Trans female/Trans woman
- Trans male/Trans man
- Genderqueer/Gender non-forming
- Other identity: [insert text box]

3. What is your current country of residence?

- AD - Andorra
- AE - United Arab Emirates
- AF - Afghanistan
- AG - Antigua and Barbuda
- AI - Anguilla
- AL - Albania
- AM - Armenia
- AO - Angola
- AQ - Antarctica
- AR - Argentina
- AS - American Samoa
- AT - Austria
- AU - Australia
- AW - Aruba
- AZ - Azerbaijan
- BA - Bosnia and Herzegovina
- BB - Barbados
- BD - Bangladesh
- BE - Belgium
- BF - Burkina Faso
- BG - Bulgaria
- BH - Bahrain
- BI - Burundi
- BJ - Benin
- BL - Saint Barthelemy
- BM - Bermuda
- BN - Brunei
- BO - Bolivia
- BR - Brazil
- BS - Bahamas, The
- BT - Bhutan
- BV - Bouvet Island
- BW - Botswana

- BY - Belarus
- BZ - Belize
- CA - Canada
- CC - Cocos (Keeling) Islands
- CD - Congo, Democratic Republic of the
- CF - Central African Republic
- CG - Congo, Republic of the
- CH - Switzerland
- CI - Cote d'Ivoire
- CK - Cook Islands
- CL - Chile
- CM - Cameroon
- CN - China
- CO - Colombia
- CR - Costa Rica
- CU - Cuba
- CV - Cape Verde
- CW - Curacao
- CX - Christmas Island
- CY - Cyprus
- CZ - Czech Republic
- DE - Germany
- DJ - Djibouti
- DK - Denmark
- DM - Dominica
- DO - Dominican Republic
- DZ - Algeria
- EC - Ecuador
- EE - Estonia
- EG - Egypt
- EH - Western Sahara
- ER - Eritrea
- ES - Spain
- ET - Ethiopia
- FI - Finland
- FJ - Fiji
- FK - Falkland Islands (Islas Malvinas)
- FM - Micronesia, Federated States of
- FO - Faroe Islands
- FR - France
- FX - France, Metropolitan
- GA - Gabon
- GB - United Kingdom
- GD - Grenada
- GE - Georgia
- GF - French Guiana

- GG - Guernsey
- GH - Ghana
- GI - Gibraltar
- GL - Greenland
- GM - Gambia, The
- GN - Guinea
- GP - Guadeloupe
- GQ - Equatorial Guinea
- GR - Greece
- GS - South Georgia and the Islands
- GT - Guatemala
- GU - Guam
- GW - Guinea-Bissau
- GY - Guyana
- HK - Hong Kong
- HM - Heard Island and McDonald Islands
- HN - Honduras
- HR - Croatia
- HT - Haiti
- HU - Hungary
- ID - Indonesia
- IE - Ireland
- IL - Israel
- IM - Isle of Man
- IN - India
- IO - British Indian Ocean Territory
- IQ - Iraq
- IR - Iran
- IS - Iceland
- IT - Italy
- JE - Jersey
- JM - Jamaica
- JO - Jordan
- JP - Japan
- KE - Kenya
- KG - Kyrgyzstan
- KH - Cambodia
- KI - Kiribati
- KM - Comoros
- KN - Saint Kitts and Nevis
- KP - Korea, North
- KR - Korea, South
- KW - Kuwait
- KY - Cayman Islands
- KZ - Kazakhstan
- LA - Laos

- LB - Lebanon
- LC - Saint Lucia
- LI - Liechtenstein
- LK - Sri Lanka
- LR - Liberia
- LS - Lesotho
- LT - Lithuania
- LU - Luxembourg
- LV - Latvia
- LY - Libya
- MA - Morocco
- MC - Monaco
- MD - Moldova
- ME - Montenegro
- MF - Saint Martin
- MG - Madagascar
- MH - Marshall Islands
- MK - Macedonia
- ML - Mali
- MM - Burma
- MN - Mongolia
- MO - Macau
- MP - Northern Mariana Islands
- MQ - Martinique
- MR - Mauritania
- MS - Montserrat
- MT - Malta
- MU - Mauritius
- MV - Maldives
- MW - Malawi
- MX - Mexico
- MY - Malaysia
- MZ - Mozambique
- NA - Namibia
- NC - New Caledonia
- NE - Niger
- NF - Norfolk Island
- NG - Nigeria
- NI - Nicaragua
- NL - Netherlands
- NO - Norway
- NP - Nepal
- NR - Nauru
- NU - Niue
- NZ - New Zealand
- OM - Oman

- PA - Panama
- PE - Peru
- PF - French Polynesia
- PG - Papua New Guinea
- PH - Philippines
- PK - Pakistan
- PL - Poland
- PM - Saint Pierre and Miquelon
- PN - Pitcairn Islands
- PR - Puerto Rico
- PS - Gaza Strip
- PS - West Bank
- PT - Portugal
- PW - Palau
- PY - Paraguay
- QA - Qatar
- RE - Reunion
- RO - Romania
- RS - Serbia
- RU - Russia
- RW - Rwanda
- SA - Saudi Arabia
- SB - Solomon Islands
- SC - Seychelles
- SD - Sudan
- SE - Sweden
- SG - Singapore
- SH - Saint Helena, Ascension, and Tristan da Cunha
- SI - Slovenia
- SJ - Svalbard
- SK - Slovakia
- SL - Sierra Leone
- SM - San Marino
- SN - Senegal
- SO - Somalia
- SR - Suriname
- SS - South Sudan
- ST - Sao Tome and Principe
- SV - El Salvador
- SX - Sint Maarten
- SY - Syria
- SZ - Swaziland
- TC - Turks and Caicos Islands
- TD - Chad
- TF - French Southern and Antarctic Lands
- TG - Togo

- TH - Thailand
- TJ - Tajikistan
- TK - Tokelau
- TL - Timor-Leste
- TM - Turkmenistan
- TN - Tunisia
- TO - Tonga
- TR - Turkey
- TT - Trinidad and Tobago
- TV - Tuvalu
- TW - Taiwan
- TZ - Tanzania
- UA - Ukraine
- UG - Uganda
- UM - United States Minor Outlying Islands
- US - United States
- UY - Uruguay
- UZ - Uzbekistan
- VA - Holy See (Vatican City)
- VC - Saint Vincent and the Grenadines
- VE - Venezuela
- VG - British Virgin Islands
- VI - Virgin Islands
- VN - Vietnam
- VU - Vanuatu
- WF - Wallis and Futuna
- WS - Samoa
- XK - Kosovo
- YE - Yemen
- YT - Mayotte
- ZA - South Africa
- ZM - Zambia
- ZW - Zimbabwe

4. What is your relationship status?

- Single, never married
- Married or domestic partnership
- Widowed
- Divorced
- Separated

5. What is the highest level of school you have completed? (If enrolled in school, choose the highest degree you have received thus far.)

- No school completed

- Elementary School (5-6 years of schooling)
- 8th grade (8-9 years of schooling)
- Some high school (9-12 years of schooling)
- High school graduate or equivalent (i.e. GED)
- Some college, no degree
- Technical or vocational training
- Associate degree (2 years of college education with degree)
- Bachelor's degree (4 years of college education with degree)
- Graduate degree

6. What is the total number of years of education you have completed in your life? [text box]

7. What is your occupational status?

- Employed for wages
- Self-employed
- Out of work and looking for work
- Out of work but not currently looking for work
- A homemaker
- A student
- Military
- Retired
- Unable to work

8. If you are employed, do you work part-time or full-time?
- Part-time
- Full-time
- Not currently employed