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Not-So-Neutral: An Exploration of the Relationship Between Smartphones and Student Quality of Life

Talis Rudzitis

NOT-SO-NEUTRAL: AN EXPLORATION OF THE RELATIONSHIP BETWEEN

SMARTPHONES AND STUDENT QUALITY OF LIFE

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_____   _____
Todd Ream, PhD.   Date   Drew Moser, PhD.   Date
Thesis Supervisor   Member, Thesis Hearing Committee

_____
Tim Herrmann, PhD.   Date
Member, Thesis Hearing Committee

_____
Tim Herrmann, Ph.D.   Date
Director, M.A. in Higher Education and Student Development

Abstract

As smartphones grow in purpose and function, they become more pervasive in the average college student's life. Consequently, the more students integrate smartphones into their lives, the more consideration must be taken to understand the impact smartphones have on human life. This correlation study explored the relationship between smartphones and student quality of life. For the purpose of the study, "smartphone consumption" best communicated the variable "smartphones" and was measured by the average number of minutes participants spent on their smartphones per day. Moreover, the variable "quality of life" was measured by students' self-perception and satisfaction of their own health encompassing the following four categories: mental, physical, social, and spiritual. The study was conducted at a small, faith-based liberal arts school in the Midwest with 97 total participants. Smartphone consumption and quality of life responses were compared among participants to discover whether correlations exist. Gender differences were also explored. Overall, the results indicated no correlation to moderate negative correlation (i.e., greater smartphone consumption correlated with lesser quality of life satisfaction). Educators and students are strongly encouraged to consider smartphone consumption and its potential effects on individual quality of life.

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Chapter 1

Introduction

According to college enrollment statistics in 2016, approximately 20 million

students attended a college or university, and approximately 12 million of those 20

million attended full-time (National Center for Education Statistics, 2018). Students

attend college for a variety of reasons, and those reasons quite often relate to a pursuit of

a self-perceived positive quality of life (QoL). For example, students may attend college

for academic investment, job readiness, social engagement, a pursuit of identity, and/or

character development to maintain or develop positive QoL. While at college, studies

show students grow in various formative capacities (Baxter Magolda, 2001; Chickering,

1969; Cross, 1971; Schlossberg, 1989) and can be influenced and molded by their

cultures (Hofstede, 1984; Parks, 1986). Due to the increasing number of students

attending college each year and college's highly formative capacities, student QoL

remains at the forefront of educators' minds.

Student Needs

This research maintained the definition of QoL from Costanza et al. (2007): "the

extent to which objective human needs are fulfilled in relation to personal or group

perceptions of subjective well-being" (p. 269). Many objective needs and subjective

perceptions shape students' perspectives of their overall QoL. Maslow's (1943)

Hierarchy of Needs suggests the most basic human needs include rest, energy through food and water, and safety. These physical needs form the foundation of positive QoL. Next, the Hierarchy of Needs suggests humans desire psychological and self-fulfillment needs, such as a sense of love or belonging, esteem, and self-actualization (in order from most foundational to least foundational). Hypothetically, students achieve and maintain positive QoL if all physical, psychological, and self-fulfillment needs are met.

As previously stated, higher education is filled with opportunities to grow in formative capacities, many of which promote or help to fulfill students' physical, psychological, or self-fulfillment needs. For example, Chickering and Reisser (1993) described a student's longing for and fulfillment of purpose and identity during their years within higher education. Students who identify and pursue a major related to their strengths, passions, or interests may experience the fulfillment of purpose and identity as it relates to present learning and future professionalism. In summation, students must experience the growth and fulfillment of their foundational human needs to maintain positive QoL. These include physical, psychological and self-fulfillment needs.

Technological Impact on Human QoL

Technological advances have greatly influenced human QoL. Inventions and discoveries including the wheel, paper, gunpowder, the printing press, light bulbs, the steam engine, cars, and airplanes have all impacted how humans engage the world and relate to each other. According to Lukasiak and Jakubowski (2010), however, no set of discoveries changed the world as dramatically as those involving semiconductors, particularly integrated circuits. For centuries, researchers have worked with semiconductors to enhance communication and data processing.

In recent decades, researchers have increased the efficiency and use of semiconductors to create cheaper, more powerful devices such as the computer, tablet, and smartphone. Based on these advancements, Moore (1965) predicted technology would grow exponentially every two years from the mid-1960s. While this progression has slowed (three years at times instead of two) recently, all indications suggest rapid growth will continue (Friedman, 2016). As semiconductor efficiency and growth continue, so technological devices will become smarter, stronger, and faster.

The Influential Smartphone

For many reasons, powerful devices easily capture human attention as they grow in function and capability. Thanks to technological discoveries, devices using semiconductors will continue to stimulate human attention and experience as they become more advanced. As human desire grows for each device, so grows the device's influence on human QoL.

Above all other technological devices of its time, the smartphone garnered the greatest human attention when, in 2013, three in every four teens were "mobile internet users" who employed some form of mobile device to access the internet (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013). Similar to the television or the internet, the smartphone is designed as a tool to enhance human life through each app and function. However, the accumulation of the smartphone's mobile function and widespread capabilities offers its users the opportunity to use the device in nearly every situation and at any time of day. As humans choose to use smartphones in more segments of their world—work, entertainment, communication, banking, photography, and keeping time, to name a few—they become more reliant on their devices. Consequently, smartphones

may become more like a taskmaster than a tool. Users must be mindful how best to use their smartphones in healthy ways.

Purpose of Research

Smartphones affect QoL as students attach more time, resources, and identity to their devices, especially when students use their smartphones to fulfill or hinder physical, psychological, or self-fulfillment needs. How best to engage smartphones as students and educators remains as a question on observant minds. This research explored the question, "How does the time undergraduate students spend on their smartphones relate to their overall quality of life, particularly their mental, physical, social, and spiritual health?" The findings offer students and educators practical data to consider how best to use smartphone devices in personal, educational, and professional dimensions.

Benefits of Research

This research benefited participants by encouraging them to use their smartphone device with purpose. By collecting and considering their smartphone consumption, some participants found their smartphone device had taken more of their daily life than they would prefer. Thus, this study encouraged some users to apply more guidelines to their daily smartphone use. Overall, maintaining proper smartphone use as perceived by its user may benefit overall QoL, particularly in mental, physical, social, and spiritual health.

Furthermore, this research benefits parents and higher education professionals alike. During the formative years of college (Astin, 1984), students need influential leaders who encourage their overall growth and learning. This research guides influential leaders to encourage and challenge their students to use proper self-control and power over their smartphone devices. By doing so, overall QoL may improve.

Chapter 2

Literature Review

The following paragraphs detail an attempt to cover all former and current works pertaining to this research. In particular, a review of the literature on the constructs "Smartphones," "Quality of Life and the College Student," "Mental Health," "Physical Health," "Social Health," and "Spiritual Health" is discussed. Studies that combine these constructs are highlighted within the review.

Smartphones

Released to the public in 2007 by Steve Jobs and Apple, smartphones rapidly monopolized the handheld device industry. Friedman (2016) called 2007 a period of "technological revolution." By 2015, nearly two billion people around the globe used smartphones (Statista, 2015). Brynjolfsson and McAfee (2014) included smartphones as a major contributor to the "Second Machine Age," a phrase dubbed to describe the phenomenon in which machines began to replace rather than enhance human work. So what is the smartphone, and why did it gain so much attention?

As defined by TechTarget (2007), a smartphone is a "cellular telephone with an integrated computer and other features not originally associated with telephones, such as an operating system, Web browsing and the ability to run software applications" (para. 1). Early in their development, smartphones were characterized for merging telecom and internet properties; for the first time, an individual could use one device for both wireless

phone calls and browsing the internet (Ballagas, Borchers, Rohs, & Sheridan, 2006; Zheng & Ni, 2006). This merging offered the average user the ease and capability of using one device for instant communication and internet searches almost anywhere.

Much like any device, smartphones went through early growing pains. For example, smartphones caused immediate concerns regarding safety from hackers and privacy security as users engaged with personal contact information online (Guo, Wang, & Zhu, 2004). Additionally, researchers were concerned about the reliability of applications that claimed to think for the user, specifically navigation tools (Ricker, Schuurman, & Kessler, 2014). Whatever challenges smartphone developers faced in the early years of the device's existence, tweaks and upgrades offered the smartphone and its users the capabilities to do more at faster rates and with better quality.

As previously mentioned, Moore's (1965) Law accurately predicted this rapid technological development by stating that, every two years from the mid-1960s, technologists would double the number of components on an integrated circuit—the same circuit now within a smartphone. Whereas in 1970, the number of components in an Intel Processor was roughly three thousand, in 2007 that count increased to beyond three billion. In lay terms, the amount of information stored on small technological devices increased dramatically, thus paving the way for convenient access to powerful devices like a smartphone. As users enjoy their devices and demand more efficiency, developers enhance the experience in order to increase user demand.

The useful properties of today's smartphones are endless, making the device a "catch-all" experience. People use smartphones today in a variety of capacities in the workplace, and many people have studied the impact of smartphones on human life. For

example, in nursing, Park and Chen (2007) studied motivations for nurse and doctor

adoption of smartphones. In business, Holzinger, Treitler, and Slany (2012) found better

use of apps to target the consumer, while Kaplan and Haenlein (2010) found better use of

social media to generate income. In the workforce, Middleton and Cukier (2006) spoke

of both the enhancement and distraction of Gmail and other email mediums—now

accessible through apps within smartphones—on workflow.

In addition to the workplace, professionals use and study smartphones in the

education system. Norris, Hossain, and Soloway (2011) found smartphones and other

online learning devices relevant to 21st-century students arguing for the necessity to

update how one learns in the classroom (e.g., eLearning, which incorporates technology

to learn curriculum in or outside the classroom). Leece and Campbell (2011) found

positive implications related to engaging higher education students through social media

and Emoticons. Similarly, Gikas and Grant (2013) determined smartphones, cellphones,

and social media could all increase positive learning outcomes in the classroom. Also

available to student learning are smartphone applications that serve to enhance students in

their traditional subjects or tests (e.g., Brainscape, Ready4 SAT, and Periodic Table).

Furthermore, people use smartphones for relationships and entertainment. Social

media outlets have seen large increases in users over time. According to Clement

(2018b), the number of monthly active Facebook users (worldwide) grew to 2.1 billion at

the end of 2017, while Instagram obtained 800 million total monthly users by September

2017 (Clement, 2017), and Snapchat secured 187 million total users at the end of 2017

(Clement, 2018a). Additionally, entertainment outlets featuring videos and TV shows

also increased. For example, YouTube housed 1.5 billion users in 2017 (Clement,

2018c), while Netflix serviced 125 million subscriptions (Watson, 2018). Lastly, popularity for mobile gaming apps increased. For example, in the U.S., the number of users grew from 80.7 million in 2012 to 164.9 million in 2015 and are projected to grow to 213 million by 2020 (Statista, 2016). While the aforementioned numbers do not all indicate the number of *smartphone* users, every online relationship and entertainment medium mentioned is accessible through smartphone applications.

Notably, many other popular smartphone applications exist, including those related to art, music, banking, travel, shopping, file sharing, and privacy, among others. All in all, there exists a surplus of smartphone uses through popular applications available to smartphone users. As one may see, the smartphone offers a "catch-all" experience to its users. Students utilizing these applications naturally integrate their smartphone devices into their everyday lives.

Quality of Life and the College Student

Many people across time, disciplines, and countries have sought to define and quantify the elusive term *quality of life* (QoL) (Diener & Suh, 1997; Hofstede, 1984; Nussbaum & Sen, 1993; Ravens-Sieberer & Bullinger, 1998; WHOQoL Group, 1995). In fact, a search through Google Scholar yields 310,000+ professional works with the phrase *quality of life* in their titles. Costanza et al. (2007) defined QoL by combining objective human need with subjective human feelings of happiness, well-being, and overall life satisfaction. They determined QoL to have both objective and subjective elements. Their study drew on multiple disciplines to measure overall QoL and discover how one may enhance QoL. Costanza et al. subsequently defined QoL as "the extent to

which objective human needs are fulfilled in relation to personal or group perceptions of subjective well-being" (p. 269).

This study maintained the definition of quality of life from Costanza et al. (2007) in relation to four categories of individual human health needs: mental, physical, social, and spiritual. Many student development theorists gleaned the importance of each of these four categories of quality of life within higher education (Astin, 1984; Astin, Astin, & Lindholm, 2011; Chickering, 1969; Parks, 1986; Perry, 1968). For this study, mental aspects included using and growing the brain through positive mental challenge and engagement (Baxter Magolda, 1992; Perry, 1968). Physical aspects included proper sleep and physical exercise (Gill et al., 2013; Pilcher, Ginter, & Sadowsky, 1997). Social aspects included a sense of belonging, close personal relationships, and positive activity with others (Astin, 1984; Chickering, 1969). Finally, spiritual aspects—viewed through a Judeo-Christian lens—included a relationship with God and spiritual practices and disciplines (Astin et al., 2011; Parks, 1986).

Primarily, QoL is determined through the experience and perception of each individual by the phrase *subjective well-being* (Diener & Suh, 1997). Positive QoL is experienced when students perceive access to resources that meet their most basic needs: food, water, sleep, and safety (Maslow, 1943). Additionally, positive QoL is experienced when a student believes they maintain health within the various elements of QoL: mental, physical, social, and spiritual. Student "subjective well-being" through self-perception is thus the main indicator of positive or negative QoL.

Secondarily, individual-perceived QoL is determined in part by group or community perceptions of QoL. Given the fact that cultures place value on people,

places, and things collectively, individuals perceive or experience quality of life positively or negatively based on their relation to said cultural value system (Hofstede, 1984). Initially, humans are greatly influenced by the cultures that raise them. However, as they grow and develop by experiencing multiple communities and cultures, individual values and beliefs become more grounded. This "grounding" indicates an individual's ownership of personal or shared beliefs, including their understanding of personal purpose and uniqueness (Kohlberg, 1981). Within higher education, many students begin this grounding process by discovering their identity and purpose for the first time (Chickering & Reisser, 1993).

Therefore, cultural value systems within higher education may greatly influence student QoL. As Madden et al. (2013) shared, smartphone usage among teenagers is on the rise. Naturally, a cultural value system is formed: "own and use a smartphone for social engagement, work communication, entertainment, etc. to be like the majority of people." Based on this cultural value-system in college, smartphones influence students and their self-perception of a positive QoL.

Smartphones and Student Quality of Life

Given the all-encompassing nature of smartphones in American society today, users must understand the ways these devices may influence their daily lives. By studying the four elements of QoL—mental, physical, social, and spiritual—in relation to smartphones, readers will have a better understanding how smartphones positively and negatively affect students within higher education.

Mental health. According to the Surgeon General, mental health is a "state of successful performance of mental function, resulting in productive activities, fulfilling

relationships with other people, and the ability to adapt to change and cope with adversity" (U.S. Department of Health and Human Services, 1999, p. 4). Higher education is defined by opportunities for productive activity, relationships, and difficult change. How a student engages these opportunities influences their overall growth and health (Astin, 1984).

Engaging in mental development is challenging. Effective professors motivate students toward productive activity by academic rigor. Students who meet the demands of academic rigor change positively as a result. In addition to academic challenge, students must also face challenge through engaging in disagreements with others. Perry (1968) posited that students experience differing belief systems during college. According to Perry, if students positively engage in conversation with peers about these differing beliefs, they develop mentally.

These opportunities for mental development require attentiveness and focus. Konig, Buhner, and Murling (2005) found engaging in multiple tasks simultaneously most often interferes with the processing of each task individually. Dzubak (2016) argued strongly against distractions in the classroom, sharing that losing focus on one task drastically lowered the rate of obtaining new information. With today's many uses of smartphones, opportunity for distraction is high. Smartphones can impede classroom learning or relationship building if used intentionally or unintentionally to distract from the main task (Gazzaley & Rosen, 2016). Students using smartphones to engage in something other than the classroom activity or to distract themselves from difficult conversations may struggle to learn and grow mentally.

As stated previously, professors may use smartphones to enhance the learning process if the smartphone task relates to the main teaching task (Gikas & Grant, 2013). Smartphones can positively impact how one learns through eLearning, public news, face-to-face video interaction, and various other apps. By its nature, the smartphone creates an opportunity for its user to glean instant access to infinite information. Mindful students find ways to incorporate these properties into positive avenues for growth and thereby nurture positive mental health.

While the intentional use of smartphones stimulates mental health, excessive use may damage or stunt mental health (Aljomaa, Al.Qudah, Albursan, Bakhiet, & Abduljabbar, 2016; Twenge, 2017; Yoo, Cho, & Cha, 2013). Actively analyzing smartphone use in daily life may help to maintain one's mental health. However, Meena, Mittal, and Solanki (2012) found teenage smartphone users could not accurately describe the amount of time they spent online. In extreme cases, their research showed users spending more time in cyber reality than in real life. This "excessive indulgence" negatively influenced users' personal lives, such as participation in outdoor games, social activities, and religious practices (p. 96). If these "excessive indulgence" practices are maintained in college, students' mental health through academic and social practices will suffer along with their overall development.

Furthermore, researchers also recognize the pervasiveness of excessive smartphone use in the community as a whole. In 2014, researchers from the World Health Organization (WHO) (2015) discussed excessive screen time (collective and individual) and its effects on public health. Most notably, Kaye and Farrell (2015) found individuals who gravitate toward internet and gaming addiction more likely develop

mental disorders, particularly ADHD and depression. Collectively, WHO researchers concluded that, as communities became more technologically focused, individuals within those communities may become more susceptible to mental unhealthiness. Therefore, measures and initiatives must be taken to limit and guide the use of technology to maintain proper public and mental health.

Physical health. In this study, physical health is defined as including proper exercise, nutrition, and sleep. Smartphones are addressed here in relation to exercise and sleep. Maslow's Hierarchy of Needs (1943) depicts three main categories of human needs in which the most important category for survival—"basic needs"—includes physiological needs such as food, water, warmth, and rest. To function properly, students require these basic needs before they can successfully address their other needs. Once basic physical needs are met, studies show physical practices such as exercise (Gill et al., 2013) and quality of sleep (Pilcher et al., 1997) increase overall QoL.

Smartphones have the potential to increase QoL through the use of exercise or diet-related applications and tools. Many studies measured the effectiveness of smartphone exercise/diet applications as behavioral supports, intervention, and management tools (Bort-Roig, Gilson, Puig-Ribera, Contreras, & Trost, 2014; Fanning, Mullen, & McAuley, 2012; Middelweerd, Mollee, van der Wal, Brug, & te Velde, 2014). While some smartphone apps effectively remind individuals of physical health, the ultimate motivation to remain physically healthy is still up to the individual. Therefore, smartphones have the potential to positively influence exercise and dietary habits, but further development is necessary to guarantee this positive outcome.

Unfortunately, smartphones may also cause physical unhealthiness by disturbing sleep when used during bedtime and the sleeping period. Researchers related heavy nighttime smartphone use to sleep deprivation; longer average screen-time was connected to a harder time falling asleep, fewer hours of sleep, and a poorer overall quality of sleep (Christensen et al., 2016; Lemola, Perkinson-Gloor, Brand, Dewald-Kaufmann, & Grob, 2014). In turn, sleep deprivation was linked to heart disease (Ayas et al., 2003), depressive symptoms (Fredriksen, Rhodes, Reddy, & Way, 2004), and obesity (Gangwisch, Malaspina, Boden-Albala, & Heymsfield, 2005). Additionally, lack of sleep on college campuses negatively impacts academic performance (Kelly, Kelly, & Clanton, 2001). To avoid unhealthy behaviors and habits during college, limiting smartphone consumption before and during overnight sleep is a recommended code of conduct for all users (Lanaj, Johnson, & Barnes, 2014).

Social health. Russell (1973) defined social health as "that dimension of an individual's well-being that concerns how he [or she] gets along with other people, how other people react to him [or her], and how he [or she] interacts with social institutions and societal mores" (p. 75). The term *individual* is key to this definition and to this study. While social health is experienced and maintained by a group of people, observing social health in relation to smartphones requires a primary focus on individual social health. To achieve and maintain a positive individual QoL through social health, researchers have suggested students must experience a sense of belonging (Schlossberg, 1989), identity (Cross, 1971; Helms, 1990; Josselson, 1987; Wijeyesinghe & Jackson, 2012), self-authorship (Baxter Magolda, 1992), and purpose (Chickering, 1969). Smartphones may enhance and/or diminish these factors of social health and student QoL

in college; for example, using social media, blogging, entrepreneurship, or playing video games can each enhance and/or diminish these factors.

To engage in positive social health, researchers have shared the importance of face-to-face interaction. In business, Kirkman, Rosen, Tesluk, and Gibson (2004) studied virtual team performance in the workplace and concluded teams who met face-to-face more frequently experienced more team empowerment than those who met less frequently. In children, a Stanford University study found a positive correlation between higher levels of face-to-face interaction, greater social success, and greater feelings of normalcy, among others (Pea et al., 2012). In adults battling loneliness, active face-to-face interaction more successfully supported positive social interaction than social media (Kim, 2017). In fact, Kim found lonely adults used social media as a passive coping route to distract from loneliness rather than to fight loneliness. The more a lonely person used a smartphone to interact with others instead of face-to-face conversation, the more difficulty he or she found interacting with others face-to-face. In turn, he or she then became lonelier.

Smartphones provide powerful relationship mediums through social media that do not require face-to-face interaction. Many have used these mediums to enhance already-established relationships in real life (Reich, Subrahmanyam, & Espinoza, 2012). However, Twenge (2017) found teens spent about an hour less a day with their peers than in previous generations and averaged six hours a day on media (i.e., messaging, internet browsing, electronic gaming, and video chat). Similar to Kim's (2017) data on loneliness, Twenge (2017) concluded establishing one's sense of belonging, identity, self-authorship, and purpose on social media as opposed to more face-to-face

relationships proved to negatively affect QoL. In fact, "teens who spend more than three hours a day on electronic devices are 35% more likely to have at least one suicide risk factor" (Twenge, 2017, pp. 83–84).

On the other hand, through social media and other technological outlets, smartphones—among other devices—have greatly increased communication and work on a global level (Flew, 2014; Friedman, 2016). Due to smartphone features of quick access, internet searching, and limitless communication, users may unite with others globally in any location with cell phone service. These features create seemingly endless and useful possibilities of global creativity and engagement without ever having to meet with others in person. If used carefully, cautiously, and purposefully, smartphones may enhance social health within one's life. Overall, to remain socially healthy, students must form proper relationships with people face to face, mindfully analyze smartphone use, and use their smartphone to realistically and purposefully enhance relationships.

Spiritual health. In an attempt to define spiritual health, this study maintained Astin's (2004) description of spirituality. According to Astin, spirituality involves two important qualities. First, spirituality inhabits the subjective lives of people and their interior consciousness. Second, spirituality involves both affective and cognitive functioning, including feelings, intuitions, inspirations, and imagination alongside reasoning, logic, and analysis. Together these two qualities—a person's subjectivity and their whole person meaning-making—create a person's beliefs and values. Astin (2004) claimed "virtually everyone qualifies as a spiritual being" (p. 34), although this study viewed spiritual health primarily through a Judeo-Christian lens.

Astin's (2004) description of spirituality was heavily personalized. Similarly, the University of California-Riverside (2017) defined spiritual health as a "personal matter involving values and beliefs that provide a purpose in our lives" (p. 2). Furthermore, spiritual health generally involves a striving for congruence and peace with self and others while balancing one's own needs with those of the surrounding world. According to these specifications, one may find spiritual health through aligning their actions with their personal beliefs and values.

In addition to personal beliefs and values, Chandler, Holden, and Kolander (1992) detailed the importance of a "greater knowledge" and "greater capacity to love" that implies a purpose larger than any one individual purpose and a "transcendence" that extends past personal self-interest (p. 169). Consequently, to maintain proper spiritual health, students must make an effort to live with a greater purpose for life that extends beyond personal self-interest and to act in a manner that reflects their ultimate beliefs and values. All in all, a person maintains spiritual health by adhering to their personally accepted beliefs and values and by applying such beliefs and values in relation to something greater than themselves.

Spirituality has seen decline when students prioritize other things above spiritual beliefs, values, or practices (Astin et al., 2011). In the Judeo-Christian belief system, God commands his people to place him before and above all other things (Exodus 20:3). Related to this study, if a Christian consistently uses a smartphone before and above seeking God, poor spiritual health may ensue. In one study surveying 8,000 Christians about smartphone routines, Reinke (2017) found 73% of participants were more likely to check social media or email *before* spiritual disciplines on a typical morning. This study

did not reveal participant spiritual health but, rather, revealed the tendency to use a smartphone before spiritual practices.

Additionally, students who place personal value on their smartphone may struggle for spiritual health. Ko (2015) found a participant welcoming the idea of always carrying their smartphone: "I always like to have it around me because I think it will improve how I see myself" (p. 401). Using a smartphone as an extension of the individual conflicts with spiritual understandings of human innate uniqueness and worth.

Finally, spiritual health may lack when an individual cannot concentrate properly on a task at hand. Ko (2015) found one participant struggling for control over distraction caused by his smartphone: "Even when I prepare for a test, I keep looking to see who has contacted me. Once engaged, I'll stop studying and continue chatting with my friends" (p. 400). Detweiler (2013) argued, "We are hyperconnected and easily distracted, always available and rarely present" (p. 6). Spiritual practices of solitude, contemplation, and meditation, among others, all require deep concentration. A student easily distracted by his or her phone will find spiritual practices difficult to prioritize. When spiritual health is not prioritized well, overall QoL will suffer.

Conclusion

A review of the literature detailed the cultural integration of the smartphone device into everyday life of the college student. Dorsey (2015) claimed technology for those born on or after the year 2000 became "THE experience," the only experience" (9:31). For the current college student, a world without a smartphone has barely or never been experienced. Detweiler (2013) warned of the temptation to "prostrate oneself before [technology]," to "fashion and mold [oneself] into its insistent (now!), efficient (faster!),

and greedy (more!) image" (p. 225). When smartphones are "THE experience" (Dorsey, 2015, 9:31), the insistent, efficient, and greedy qualities of the device can creep into the user's nature and character if the user is not mindful of its influence.

Students must carefully consider the cultural integration of smartphones to maintain proper quality of life through mental, physical, social, and spiritual health. A well-informed balance of smartphone consumption offers students proper measures to use a smartphone in good conscience with their health. Students may achieve such a balance by mindfully analyzing and limiting smartphone use. The following chapter on methodology details the procedure students took to mindfully consider their smartphone consumption and how their devices might relate to their overall quality of life.

Chapter 3

Methodology

This quantitative correlation study observed students' smartphone consumption in correlation with their overall health. Correlations were examined between time spent on the smartphone device and students' self-perception of their own QoL through surveys. This study sought to answer the following question: "How does the time undergraduate students spend on their smartphones relate to their overall quality of life, particularly their mental, physical, social, and spiritual health?"

Context and Participants

The study was conducted at a small faith-based 4-year institution in the Midwest. Participants at this school are required to sign a Christian faith statement. Therefore, questions related to spiritual QoL were asked through a Judeo-Christian lens. All participants were enrolled in one of three entry-level computing courses discussing the mindful use of technology, among other topics. As a course learning experience, all 171 students enrolled in the courses were required to take a survey on their own QoL, record daily time spent on their smartphone, and reflect on personal data collection through a reflection paper. Participants were asked if they would be willing to opt into this correlation study. All in all, 97 participants opted in and met the criteria for the study. Of the 97, 60 participants were female and 37 male, mostly freshmen or sophomores, predominantly European American/White, and predominantly born in the U.S.

Instrument

Participants completed a quality of life survey that measured the following domains: overall quality of life, physical health, mental health, social health, and spiritual health (Appendix A). Many questions were drawn or revised from another QoL survey. While permission was given to use and revise the QoL survey, the survey representative requested anonymity since the survey was edited. In addition to questions drawn from the other QoL survey, questions were added to consider spiritual health. All questions were verified through face validity.

Procedure

All necessary parties including thesis supervisor, methodology supervisor, Director of Residence Life at the faith-based institution, participant course professor, and IRB of the faith-based institution critiqued and confirmed the study, after which a pilot study was administered to evaluate the QoL instrument using face validity. The course instructor and the researcher introduced the research project to the class. Students then received an informed consent form (Appendix B) and chose whether or not to participant in the study. While in class, participants completed the quality of life survey.

In the following weeks, class members partook in the assigned data collection—daily logging personal time of smartphone engagement for two weeks—and personally reflecting on their experience per the instructor's guidance. The assigned data collection was gained through the smartphone apps Moment for iPhone users and SPACE for Android or Google users, which recorded smartphone consumption. Participants logged their daily time spent on their smartphone through surveys on Google Forms. To maintain privacy, participant personal information was removed from the data after the

surveys were organized and cleansed. Last, the preliminary data results were presented to the classes at the end of the semester.

Data Analysis

The data was analyzed to investigate the relationship between smartphone consumption and student quality of life. The first step was to analyze the data via scatterplots through SPSS. Creswell (2012) noted that scatterplots help a researcher to identify associations between two variables, particularly by way of the direction and form of the plotted points. Furthermore, scatterplots helped the researcher to identify the strength of correlation between to variables by providing a visual representation of the represented data.

Alongside scatterplots, data was displayed through a correlation matrix. Similar to scatterplots, a correlation matrix informed this researcher regarding the form, direction, and strength of the association and correlation between variables. Whereas scatterplots offered a visual representation of the data, a correlation matrix offered a numerical representation. The association between variables is most accurately communicated by way of a correlation matrix, which is presented in the next chapter.

Chapter 4

Results

The quantitative correlation study provided a number of details about the relationships between self-perceived quality of life and smartphone consumption. The six independent variables—smartphone consumption, overall quality of life, mental health, physical health, social health, spiritual health—were measured for correlation through IBM SPSS statistics and communicated in three correlation matrices, two of which detail gender-specific correlations. Overall, the data revealed strength between variables ranging from no correlation to moderate negative correlation. The following chapter details a description of the participants, a description of the statistics, an analysis of the data, and a brief interpretation of the findings.

Participants

The study included 97 participants. Participant demographics are detailed in Table 1 below.

Table 1

Participant Descriptive Statistics

Participant Information	n	Percentage
Gender (Sex)		
Female	60	62%
Male	37	38%
Class Status		
Freshman	69	71%
Sophomore	18	19%
Junior	6	6%
Senior	3	3%
Age		
18	54	56%
19	27	28%
20	8	8%
21	6	6%
23	1	1%
Race/Ethnicity		
African American/Black	2	2%
Asian/Pacific Islander	2	2%
European American/White	84	87%
Hispanic/Latino	6	6%
Multiracial	2	2%
Native American	1	1%
Birth Residence		
Born in the U.S.	88	91%
Born in a country other than the U.S.	9	9%

Variable Descriptive Statistics

Before the variables were measured for correlation, descriptive statistics were

analyzed on all variables to visually and statistically explore central tendencies (mean),

standard deviation, and normality (skewness and kurtosis). Variables considered

included smartphone consumption, overall quality of life, mental health, physical health,

social health, and spiritual health. Variable statistics are shown in Table 2.

Table 2

Variable Descriptive Statistics

Variable	<u>*M*</u>	<u>*SD*</u>	<u>Skew</u>	<u>Kurtosis</u>
Smartphone Consumption	168.66	68.56	2.25*	0.78
Overall Quality of Life	3.98	.42	-1.02	-0.82
Mental Health	3.94	.54	-1.59	-1.09
Physical Health	3.81	.61	-2.87*	0.89
Social Health	4.11	.54	-3.61*	2.00*
Spiritual Health	3.62	.70	-0.53	-0.72

Note. M = Mean. SD = Standard Deviation. * = nonnormal distribution. The Smartphone
Consumption mean was measured in average minutes per day over a 14-day period. All
other variables were measured on 5-point scale for which a score of 1.0 represents the
lowest self-perceived health measurement and 5.0 represents the greatest self-perceived
health measurement.

Correlation Process

Three of the six variables had elements of nonnormality (Table 2). Due to the

nonnormal tendencies of three variables, particularly smartphone consumption,

correlations were measured on Spearman's nonparametric, rank order correlation.

Correlations (Table 3) were calculated in SPSS between smartphone consumption,

overall quality of life, mental health, physical health, social health, and spiritual health.

Table 3

Correlation Matrix for All Variables

Variables	1	2	3	4	5	6
1. Smartphone Consumption	—					
2. Overall Quality of Life	-.309**	—				
3. Mental Health	-.251*	.880**	—			
4. Physical Health	-.205*	.698**	.688**	—		
5. Social Health	-.139	.799**	.711**	.371**	—	
6. Spiritual Health	-.293**	.704**	.434**	.297**	.443**	—

Note. ** = Correlation is significant at the *p*=0.01 level (2-tailed). * = Correlation is significant at the p=0.05 level (2-tailed). Column 1 details the correlations measured and analyzed.

Correlation Description

Correlation strength was measured based on Cohen and Manion's (as cited in

Creswell, 2012) guide for interpreting the strength of association between coefficients.

Thus, a correlation of .0-.20 revealed no significant relationship between variables, a

correlation of .20-.35 revealed slight relationship, and a correlation of .35-.65 revealed

moderate correlation. The stronger the correlation, the better predictive properties exist

in the correlation.

The primary correlation under investigation was the relationship between

smartphone consumption and the various quality of life variables. Column 1 (Table 3) of

the correlation matrix details the relationships under investigation, which revealed

negative correlations between smartphone consumption and each variable of quality of life. Whereas smartphone consumption and social health revealed almost no correlation, smartphone consumption correlated with all other variables showed a slight relationship between each. The strongest relationship was between smartphone consumption and overall quality of life at -.309, which is considered a high slight correlation.

Gender Comparison

In addition to correlations measuring all participants, correlations were measured individually for women and men on Spearman's nonparametric, rank-order correlation. Table 4 reflects all correlations between variables for women, while Table 5 reflects all correlations for men. Again, Column 1 in each table describes the primary correlations under investigation.

Table 4

Correlation Matrix for All Variables (Women Only)

Variables	1	2	3	4	5	6
1. Smartphone Consumption	—					
2. Overall Quality of Life	-.365**	—				
3. Mental Health	-.324*	.879**	—			
4. Physical Health	-.303*	.772**	.747**	—		
5. Social Health	-.169	.739**	.624**	.391**	—	
6. Spiritual Health	-.225	.668**	.429**	.360**	.349**	—

Note. ** = Correlation is significant at the p=0.01 level (2-tailed). * = Correlation is significant at the *p*=0.05 level (2-tailed). Column 1 details the correlations measured and analyzed.

Table 5

Correlation Matrix for All Variables (Men Only)

Variables	1	2	3	4	5	6
1. Smartphone Consumption	—					
2. Overall Quality of Life	-.225	—				
3. Mental Health	-.163	.873**	—			
4. Physical Health	-.035	.523**	.487**	—		
5. Social Health	-.114	.887**	.874**	.314	—	
6. Spiritual Health	-.432**	.732**	.437**	.110	.551**	—

Note. ** = Correlation is significant at the *p*=0.01 level (2-tailed). * = Correlation is significant at the p=0.05 level (2-tailed). Column 1 details the correlations measured and analyzed.

Interpretation of Findings

Most correlations between the variables showed a slight negative relationship between smartphone consumption and all categories of quality of life: overall quality of life, mental health, physical health, social health, and spiritual health. The statistics revealed that, as smartphone time increases, mental health, physical health, social health, and spiritual health decreases.

The gender-specific correlations revealed additional information. In general, a stronger negative correlation emerged between the variables in women than men, except for the correlation between smartphone consumption and spiritual health; Table 5 reflects a moderate correlation between smartphone consumption and spiritual health for men. Of note, there was also a moderate correlation for women between smartphone

consumption and overall quality of life. These two correlations provided the most significant relationships within the data.

In summary, the data revealed relationships between the variables. While some correlations revealed no relationship, others showed slight to moderate negative relationship. A discussion of the results and implications of the study is discussed hereafter.

Chapter 5

Discussion

The quantitative correlation study sought to explore the question, "How does the time undergraduate students spend on their smartphones relate to their overall quality of life, particularly their mental, physical, social, and spiritual health?" A review of the literature suggested smartphones can impact a student's life, especially at levels of extreme use or consumption (Aljomaa et al., 2016; Kaye & Farrell, 2015; Ko, 2015; Meena et al., 2012; Twenge, 2017; World Health Organization, 2015; Yoo et al., 2013).

Most related literature suggested smartphones may have an impact on certain elements of quality of life, rather than exploring quality of life as a whole. Therefore, a correlation study was conducted to explore the relationship between smartphone consumption and quality of life as a whole. In addition, smartphone consumption was correlated with specific categories of health—mental, physical, social, and spiritual—to observe consistencies or inconsistencies with previous literature. Finally, a targeted exploration of the differences between men and women was explored.

Discussion

Overall, the results reveal a relationship between students' smartphone consumption and their overall quality of life. Relationships between the variables show varying negative relationship trends. In general, however, as the amount of time participants spent on their smartphones increased, their quality of life decreased. The

data does not predict or communicate each individual case, because, as smartphone time increased, not all participants perceived a lower quality of life or lower health categories for themselves. For example, four participants spent roughly 320 minutes on their phone per day (152 minutes above the average), but two perceived their physical health as 4.2 and 4.3 out of 5 while the other two perceived a personal physical health score of 2.0. Therefore, while the results reveal a trend for this particular group, each participant story is unique. The five variable correlations are explored hereafter, beginning with the correlation between overall quality of life and smartphone consumption.

Overall quality of life. The quality of life and smartphone consumption correlation measured at a high slight negative correlation of -.309, for which women alone measured -.365. Given the "catch-all" nature of smartphones in American society as explored in the literature review, the current data communicate smartphone's possible negative influence on many areas of health. While a stronger correlation exists between these variables for women, no further information can interpret the discrepancy other than exploring the data by individual health categories. The following paragraphs explore these differences.

Mental health. The correlation between smartphone consumption and mental health revealed a slight negative correlation for both males and females, with the average collective score of -.251. This data indicates a possible inhibiting of mental health the more a student engages in smartphone usage. As discussed in Chapter 2, students who use their smartphones to distract themselves intentionally or unintentionally from the main tasks of the classroom impede classroom learning (Gazzaley & Rosen, 2016). The same conclusion can be made for study sessions or engaging in conversations, in which

the distraction of a smartphone may take students off task from their studies or conversations if the smartphone is not used to enhance these scenarios directly.

Physical health. The relationship between physical health and smartphone consumption yielded a -.205 correlation. However, significant differences exist between men and women; women scored -.303, and men scored -.035. Previous researchers explored the benefits smartphones may have on the physical health of its users through behavioral supports, interventions, and management tools (Bort-Roig et al., 2014; Fanning et al., 2012; Middelweerd et al., 2014). However, researchers exploring heavy patterns of smartphone use alongside quantity and quality of sleep found heavy nighttime use of a smartphone related to a harder time falling asleep, fewer hours of sleep, and a poorer overall quality of sleep (Christensen et al., 2016; Lemola et al., 2014). The data in this study does not add to these previous studies specifically but further communicates the need to consider smartphone time and use in one's life.

Social health. The correlation between social health and smartphone consumption yielded a mere -.139 overall, in which women scored -.169 and men scored -.114. This categorical correlation was surprising because previous studies have suggested social problems with smartphones, especially with excessive use (Twenge, 2017). In this study, seven participants averaged over 300 minutes per day (132 minutes above the average), yet all seven indicated a 3.75 or higher for personal social health. An explanation for such discrepancy cannot be determined from this study alone. One must consider the entirety of the literature when making any conclusions, and students must consider for themselves how their smartphone affects their social health.

Spiritual health. The slight correlation between spiritual health and smartphone consumption yielded a collective score of -.293. However, male participants inflated this number dramatically since their categorical score generated a startling moderate correlation of -.432 in comparison with women participants' correlation of -.225. The literature has suggested students may place undue attention and value on their smartphones, which may distract from their spiritual practices or confuse their personal value systems (Ko, 2015). While many factors influence spiritual health, the moderate negative correlation for males in this data is noteworthy. The data suggest educators should place great concern and attention on smartphones in relation to spiritual health, particularly for males. Moreover, students should take practical steps to separate themselves from their smartphones when engaging in spiritual practices if such a negative relationship exists.

Implications for Practice

First, students should mindfully and regularly reflect on the amount of time they spend on their smartphones per day. The data reveal varying negative correlations between the variables, suggesting the possibility that smartphones can negatively impact quality of life. With some variation and no data revealing causation, students must consider for themselves how they use their smartphone and for what purposes. As the data suggest, not every student will find a negative relationship between his or her smartphone consumption and quality of life. Having students reflect on their own smartphone consumption to see how satisfied they are with the current amount of time is the first step to understanding relationship. Because health changes over time, students must regularly reflect on the relationship between their smartphone consumption and

their quality of life. If a negative relationship exists, changes must be made concerning smartphone consumption.

Second, students should identify personal goals that are not currently being met. Quite possibly, less smartphone time may make room for other opportunities to be pursued with the extra time available. Participants spent on average 168 minutes (i.e., 2 hours and 48 minutes) per day on their smartphones. If participants used less time on their smartphones, they could spend their time engaging other valuable activities or more intentionally and purposefully use their smartphone time to enhance their personal values.

Because of the negative moderate correlation (-.432) between smartphone consumption and spiritual health for male participants, men in particular must ask if spiritual health is personally valuable. If so, an assessment must be made considering what affects one's spiritual health. If smartphones impede or inhibit their spiritual health, this competing practice must be addressed.

Third, educators may use this research as a means to educate various stakeholders about the potential negative impact of smartphones. As noted in the literature review, Kaye and Farrell's (2015) research in combination with World Health Organization researchers (2015) discussed how communities become more susceptible to dangerous uses of technology the more that they integrate technology into their systems. Such practical steps to gain awareness could include workshops on "healthy use of practical technology" or "technology: the not-so-neutral medium" to raise awareness.

Fourth, educators must take practical steps to implement change. As individual and public health weigh heavily on the minds of educators, practical steps must take place to maintain and increase individuals' health in an educator's sphere of influence.

Practical steps could include accountability groups purposed to limit smartphone consumption and encourage overall health and quality of life. Such accountability could include focus groups to share personal stories of proper use and overuse of technology. In addition, accountability groups could utilize current smartphone apps purposed to limit the use of screen time like Moment or SPACE or the current built-in screen time feature available on iPhones.

Implications for Future Research

First, future research must be done to broaden the participant demographic base. The study included students who are predominantly freshmen and sophomores, white, born in the U.S., college students, and professing Judeo-Christian faith. Doing the exact same correlation study with various population groups offers more data to consider and weigh. These additional studies could deny or confirm results across broader populations. Furthermore, additional studies would better communicate the impact of the pervasiveness of smartphones on today's students.

Second, future research should be done to measure for smartphone use of time (i.e., what apps students spend their time on). Measuring only for number of minutes gives limited information, while measuring for use offers more details. For example, one student may spend five hours one day having a socially refreshing conversation with their family while another student may spend five hours one day distracting themselves from what is most valuable to them. Use of time on a smartphone is as important as amount of time. Therefore, future research should incorporate use of time or study use of time directly. If possible, a correlation study considering use of time would be done with the exact same population used in this study to analyze use and amount of time side-by-side.

Third, future research should be done to seek causation. Two moderate correlations emerged within this study, either of which could be used for additional cause and effect research. For example, an additional study could measure the cause and effect relationship between smartphone consumption and overall quality of life in women. The study could measure practices of health and see if smartphones directly affect those practices. The moderate negative correlation of -.365 suggests such a relationship on some levels.

Limitations

Three factors may limit the research. First, there exists a lack of diversity in the participant demographics. While many demographic categories existed, students of color made up a mere 13%, students born in a country other than the U.S. included only 9% of the sample group, and only 9% of students indicated a class status of junior or senior. Clearly, many homogenous factors limit the scope and application of the data. Given the fact that cultures vary on many dimensions, the pervasiveness of smartphones will affect communities and individuals differently. Therefore, the data is limited to the demographics of the participant population that mainly includes white Americans who are freshmen and sophomores attending college at a school required to sign a Christian faith commitment.

Second, the instrument was not tested for validation or reliability at the highest levels. Many questions were adopted from another highly tested survey, but the survey was adjusted to fit the purposes of this study. Therefore, the survey questions and the whole survey naturally lost some reliability and validity. In fact, the scoring system of the adapted survey had to be eliminated and redone. Face validation was the method

used to test the validity and reliability of the instrument, which has its own limits of individual perception and interpretation.

Third, there exists potential bias on the part of the researcher. The researcher has seen how personal smartphone consumption can negatively affect quality of life. While a just and considerate analysis was made during the literature review and data analysis phases, there existed a suspicion of negative relationships between smartphone consumption and quality of life. While the researcher did not skew the data in any way, it is possible that the researcher leaned toward a negative interpretation.

Conclusion

The quantitative correlation study sought to explore a relationship between the amount of time an undergraduate spends on their smartphone and their overall quality of life, including mental, physical, social, and spiritual health. Overall, the data shows no correlation, slight correlation, or moderate relationships between all measured variables. Furthermore, the results indicated a negative relationship between the daily average smartphone consumption and self-perceived quality of life. In essence, as smartphone time increases, quality of life decreases. When tested for gender, women revealed moderate negative correlation between daily average smartphone time and overall quality of life. On the other hand, men revealed moderate negative correlation between smartphone consumption and spiritual health.

These results, especially the moderate correlations, can be helpful when engaging students in mindful reflection on their smartphone consumption and hopefully lead to changed behavior and habits, bringing them more self-perceived health and quality of life. Generally speaking, this research can help students practice intentional smartphone

consumption. At the very least, this study should pique curiosity about the relationship between smartphones and quality of life in a student's own life.

This study also demonstrates the value of mindful consideration in relation to smartphone consumption. Students must intentionally consider and practice proper smartphone consumption in order to use their devices as tools rather than taskmasters. Given the variability of each life, students must consider for themselves what factors indicate appropriate and healthy levels of smartphone consumption. Whatever the case for each student, however, the pervasiveness of smartphones in personal and public life merit strong consideration by every student and every educator.

References

Aljomaa, S. S., Al.Qudah, M. F., Albursan, I. S., Bakhiet, S. F., & Abduljabbar, A. S. (2016). Smartphone addiction among university students in light of some variables. *Computers in Human Behavior*, *61*, 155–164. doi:10.1016/j.chb.2016.03.041

Astin, A. W. (1984). Student involvement: A development theory for higher education. *Journal of College Student Personnel*, *25*(4), 297–308. Retrieved from https://www.middlesex.mass.edu/ace/downloads/astininv.pdf

Astin, A. W. (2004). Why spirituality deserves a central place in liberal education. *Liberal education*, *90*(2), 34–41. Retrieved from https://files.eric.ed.gov/fulltext/EJ682573.pdf

Astin, A. W., Astin, H. S., & Lindholm, J. A. (2011). *Cultivating the spirit: How college can enhance students' inner lives*. San Francisco, CA: Jossey-Bass.

Ayas, N. T., White, D. P., Manson, J. E., Stampfer, M. J., Speizer, F. E., Malhotra, A., & Hu, F. B. (2003). A prospective study of sleep duration and coronary heart disease in women. *Archives of Internal Medicine*, *163*(2), 205–209. doi:10.1001/archinte.163.2.205

Ballagas, R., Borchers, J., Rohs, M., & Sheridan, J. G. (2006). The smart phone: A ubiquitous input device. *IEEE Pervasive Computing, 5*(1), 70–77. doi:10.1109/MPRV.2006.18

Baxter Magolda, M. B. (1992). *Knowing and reasoning in college: Gender-related patterns in students' intellectual development*. San Francisco, CA: Jossey-Bass.

Baxter Magolda, M. B. (2001). *Making their own way: Narratives for transforming higher education to promote self-development*. Sterling, VA: Stylus.

Bort-Roig, J., Gilson, N., Puig-Ribera, A., Contreras, R., & Trost, S. (2014). Measuring and influencing physical activity with smartphone technology: A systematic review. *Sports Medicine*, *44*, 671–686. doi:10.1007/s40279-014-0142-5

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. New York, NY: WW Norton & Company.

Chandler, C. K., Holden, J. M., & Kolander, C. A. (1992). Counseling for spiritual wellness: Theory and practice. *Journal of Counseling & Development*, *71*, 168–175. doi:10.1002/j.1556-6676.1992.tb02193.x

Chickering, A. W. (1969). *Education and identity*. San Francisco, CA: Jossey-Bass.

Chickering, A. W., & Reisser, L. (1993). *Education and identity* (2nd ed.). San Fransisco, CA: Jossey-Bass.

Christensen, M. A., Bettencourt, L., Kaye, L., Moturu, S. T., Nguyen, K. T., Olgin, J. E., … Marcus, G. M. (2016). Direct measurements of smartphone screen-time: Relationships with demographics and sleep. *PLoS ONE*, *11*(11), 1–14. doi:10.1371/journal.pone.0165331

Clement, J. (2017). Number of monthly active Instagram users from January 2013 to September 2017 (in millions). *Statista: The Statistics Portal*. Retrieved from

https://www.statista.com/statistics/253577/number-of-monthly-active-instagram-users/

Clement, J. (2018a). Number of daily active Snapchat users from 1st quarter 2014 to 4th quarter 2017 (in millions). *Statista: The Statistics Portal*. Retrieved from https://www.statista.com/statistics/545967/snapchat-app-dau/

Clement, J. (2018b). Number of monthly active Facebook users worldwide as of 4th quarter 2017 (in millions). *Statista: The Statistics Portal*. Retrieved from https://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/.

Clement, J. (2018c). Number of YouTube users worldwide from 2016 to 2021 (in billions). *Statista: The Statistics Portal*. Retrieved from https://www.statista.com/statistics/805656/number-youtube-viewers-worldwide/.

Costanza, R., Fisher, B., Ali, S., Beer, C., Bond, L., Boumans, R., … Snapp, R. (2007). Quality of life: An approach integrating opportunities, human needs, and subjective well-being. *Ecological Economics*, *61*, 267–276. doi:10.1016/j.ecolecon.2006.02.023

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). New York, NY: Pearson Education, Inc.

Cross, W. E., Jr. (1971). The negro-to-black conversion experience. *Black World*, *20*(9), 13–27.

Detweiler, C. (2013). *iGods: How technology shapes our spiritual and social lives*. Grand Rapids, MI: Brazos Press.

Diener, E., & Suh, E. (1997). Measuring quality of life: Economic, social, and subjective
indicators. *Social Indicators Research, 40,* 189–216.
doi:10.1023/A:1006859511756#citeas

Dorsey, J. (2015, November 18). *What do we know about the generation after*
Millennials? [Video file]. Retrieved from
https://www.youtube.com/watch?v=4f16o9Q0XGE

Dzubak, C. M. (2016). The intent to learn: The impact of focused attention. *Synergy*, *9.*
Retrieved from https://www.myatp.org/wp-content/uploads/2016/06/Synergy-
Vol-9-Dzubak.pdf

Fanning, J., Mullen, S. P., & McAuley, E. (2012). Increasing physical activity with
mobile devices: A meta-analysis. *Journal of Medical Internet Research*, *14*(6),
e161. doi:10.2196/jmir.2171

Flew, T. (2014). *New media* (4th ed.). Australia: Oxford University Press.

Fredriksen, K., Rhodes, J., Reddy, R., & Way, N. (2004). Sleepless in Chicago: Tracking
the effects of adolescent sleep loss during the middle school years. *Child*
Development, *75*(1), 84–95. doi:10.1111/j.1467-8624.2004.00655.x

Friedman, T. L. (2016). *Thank you for being late: An optimist's guide to thriving in the*
age of accelerations. New York, NY: Farrar, Straus and Giroux.

Gangwisch, J. E., Malaspina, D., Boden-Albala, B., & Heymsfield, S. B. (2005).
Inadequate sleep as a risk factor for obesity: Analyses of the NHANES I. *Sleep*,
28, 1289–1296. doi:10.1093/sleep/28.10.1289

Gazzaley, A., & Rosen, L. D. (2016). *The distracted mind: Ancient brains in a high-tech*
world. Cambridge, MA: MIT Press.

Gikas, J., & Grant, M. M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones, & social media. *The Internet and Higher Education*, *19*, 18–26. doi:10.1016/j.iheduc.2013.06.002

Gill, D. L., Hammond, C. C., Reifsteck, E. J., Jehu, C. M., Williams, R. A., Adams, M. M., … Shang, Y.-T. (2013). Physical activity and quality of life. *Journal of Preventive Medicine and Public Health*, *46*(Suppl. 1), S28–S34. doi:10.3961/jpmph.2013.46.S.S28

Guo, C., Wang, H. J., & Zhu, W. (2004). Smart-phone attacks and defenses. *Hotnets III*. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.178.7423&rep=rep1&type=pdf

Helms, J. E. (1990). *Black and White racial identity: Theory, research, and practice*. New York, NY: Greenwood Press.

Hofstede, G. (1984). The cultural relativity of the quality of life concept. *Academy of Management Review*, *9*(3), 389–398. doi:10.5465/amr.1984.4279653

Holzinger, A., Treitler, P., & Slany, W. (2012). Making apps useable on multiple different mobile platforms: On interoperability for business application development on smartphones. In G. Quirchmayr, J. Basl, I. You, L. Xu, & E. Weippl (Eds.), *CD-ARES 2012 international cross-domain conference and workshop on availability, reliability, and security: Multidisciplinary research and practice for information systems* (pp. 176–189). Berlin: Springer

Josselson, R. (1987). *Finding herself: Pathways to identity development in women*. San Francisco, CA: Jossey-Bass.

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons*, *53*, 59–68. doi:10.1016/j.bushor.2009.09.003

Kaye, S., & Farrell, M. (2015). Disorders associated with excessive use of internet, computers, smartphones and similar electronic devices. In World Health Organization (Ed.), *Public health implications of excessive use of the internet, computers, smartphones and similar electronic devices meeting report* (pp. 89–100). Geneva: World Health Organization. Retrieved from http://apps.who.int/iris/bitstream/10665/184264/1/9789241509367_eng.pdf

Kelly, W. E., Kelly, K. E., & Clanton, R. C. (2001). The relationship between sleep length and grade-point average among college students. *College Student Journal*, *35*(1), 84–86. Retrieved from http://media.biobiochile.cl/wp-content/uploads/2015/03/215-4929907074434892796-The_Relationship_Between_Sleep_Lenght_and_Grade_Point_Average.pdf

Kim, J. H. (2017). Smartphone-mediated communication vs. face-to-face interaction: Two routes to social support and problematic use of smartphone. *Computers in Human Behavior*, *67*, 282–291. doi:10.1016/j.chb.2016.11.004

Kirkman, B. L., Rosen, B., Tesluk, P. E., & Gibson, C. B. (2004). The impact of team empowerment on virtual team performance: The moderating role of face-to-face interaction. *Academy of Management Journal*, *47*, 175–192. doi:10.5465/20159571

Ko, K. S. (2015). A phenomenological case study on the psychological and spiritual conflict resulting from excessive use of smartphones-focused on Christian

university students. *Indian Journal of Science and Technology*, *8*(Suppl. 1), 398–404. doi:10.17485/ijst/2015/v8iS1/59352

Kohlberg, L. (1981). *Essays on moral development: The philosophy of moral development* (Vol. 1). San Francisco, CA*:* Haper & Row.

Konig, C. J., Buhner, M., & Murling, G. (2005). Working memory, fluid intelligence, and attention are predictors of multitasking performance, but polychronicity and extraversion are not. *Human Performance*, *18*, 243–266. doi:10.1207/s15327043hup1803_3

Lanaj, K., Johnson, R. E., & Barnes, C. M. (2014). Beginning the workday yet already depleted? Consequences of late-night smartphone use and sleep. *Organizational Behavior and Human Decision Processes*, *124*(1), 11–23. doi: 10.1016/j.obhdp.2014.01.001

Leece, R., & Campbell, E. (2011). Engaging students through social media. *Journal of the Australia and New Zealand Student Services Association*, *38*, 10–14.

Lemola, S., Perkinson-Gloor, N., Brand, S., Dewald-Kaufmann, J. F., & Grob, A. (2015). Adolescents' electronic media use at night, sleep disturbance, and depressive symptoms in the smartphone age. *Journal of Youth and Adolescence, 44,* 405–418. doi:10.1007/s10964-014-0176-x

Lukasiak, L., & Jakubowski, A. (2010). History of semiconductors. *Journal of Telecommunications and Information Technology,* (1), 3–9. Retrieved from https://djena.engineering.cornell.edu/hws/history_of_semiconductors.pdf

Madden, M., Lenhart, A., Duggan, M., Cortesi, S., & Gasser, U. (2013). *Teens and Technology 2013*. Pew Research Center: The Berkman Center for Internet &

Society at Harvard University. Retrieved from

https://www.pewinternet.org/2013/03/13/teens-and-technology-2013/

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, *50*, 370–
396. doi:10.1037/h0054346

Meena, P. S., Mittal, P. K., & Solanki, R. K. (2012). Problematic use of social
networking sites among urban school going teenagers. *Industrial Psychiatry
Journal, 21*(2), 94–97.doi:10.4103/0972-6748.119589

Middelweerd, A., Mollee, J. S., van der Wal, C. N., Brug, J., & te Velde, S. J. (2014).
Apps to promote physical activity among adults: A review and content analysis.
International Journal of Behavioral Nutrition and Physical Activity, *11*, 97.
doi:10.1186/s12966-014-0097-9

Middleton, C. A., &. Cukier, W. (2006). Is mobile email functional or dysfunctional?
Two perspectives on mobile email usage. *European Journal of Information
Systems*, *15*, 252–260. doi:10.1057/palgrave.ejis.3000614

Moore, G. (1965). Cramming more components onto integrated circuits. *Electronics
Magazine*, *38*(8), 114–117. Retrieved from

https://www.cs.utexas.edu/~fussell/courses/cs352h/papers/moore.pdf

National Center for Education Statistics. (2018). *Total fall enrollment in degree-granting
postsecondary institutions, by attendance status, sex of student, and control of
institution: Selected years, 1947 through 2027* [Data file]. Retrieved from

https://nces.ed.gov/programs/digest/d17/tables/dt17_303.10.asp?current=yes

Norris, C., Hossain, A., & Soloway, E. (2011). Using smartphones as essential tools for
learning. *Educational Technology*, *51*(3), 18–25. Retrieved from

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.456.3319&rep=rep1&t
ype=pdf

Nussbaum, M., & Sen, A. (Eds.). (1993). *The quality of life*. Oxford: Oxford University
Press.

Park, Y., & Chen, J. V. (2007). Acceptance and adoption of the innovative use of
smartphone. *Industrial Management & Data Systems*, *107*, 1349–1365.
doi:10.1108/02635570710834009

Parks, S. (1986). *The critical years: The young adult search for a faith to live by.* San
Francisco, CA: Harper & Row.

Pea, R., Nass, C., Meheula, L., Rance, M., Kumar, A., Bamford, H., ... & Zhou, M.
(2012). Media use, face-to-face communication, media multitasking, and social
well-being among 8-to 12-year-old girls. *Developmental Psychology*, *48*(2), 327–
336. doi:10.1037/a0027030

Perry, W. G., Jr. (1968). *Forms of intellectual and ethical development in the college
years*. Cambridge, MA: Bureau of Study Counsel, Harvard University.

Pilcher, J. J., Ginter, D. R., & Sadowsky, B. (1997). Sleep quality versus sleep quantity:
Relationships between sleep and measures of health, well-being and sleepiness in
college students. *Journal of Psychosomatic Research*. *42*, 583-596.
doi:10.1016/S0022-3999(97)00004-4

Ravens-Sieberer, U., & Bullinger, M. (1998). Assessing health-related quality of life in
chronically ill children with the German KINDL: First psychometric and content
analytical results. *Quality of Life Research*, *7*, 399–407.
doi:10.1023/A:1008853819715

Reich, S. M., Subrahmanyam, K., & Espinoza, G. (2012). Friending, IMing, and hanging out face-to-face: Overlap in adolescents' online and offline social networks. *Developmental Psychology, 48*, 356–368. doi:10.1037/a0026980.

Reinke, T. (2017). *12 ways your phone is changing you.* Wheaton, IL: Crossway

Ricker, B., Schuurman, N., & Kessler, F. (2014). Implications of smartphone usage on privacy and spatial cognition: Academic literature and public perceptions. *GeoJournal*, *80*, 637–652. doi:10.1007/s10708-014-9568-4

Russell, R. D. (1973). Social health: An attempt to clarify this dimension of well-being. *International Journal of Health Education, 16*, 74–82.

Schlossberg, N. K. (1989). Marginality and mattering: Key issues in building community. *New Directions for Student Services*, (48), 5–15. doi:10.1002/ss.37119894803

Statista. (2015). Number of smartphone users worldwide from 2014 to 2020 (in billions). Retrieved from https://www.researchgate.net/figure/Number-of-Smartphone-Users-Worldwide-from-2014-to-2020-in-billions-Figure-4-shows-that_fig2_327816102

Statista. (2016). Number of mobile phone gamers in the United States from 2011 to 2020 (in millions). Retrieved from https://www.statista.com/statistics/234635/number-of-mobile-gamers-forecast/

TechTarget. (2007). *Smartphone*. Retrieved from https://whatis.techtarget.com/

Twenge, J. M. (2017). *iGen: Why today's super-connected kids are growing up less rebellious, more tolerant, less happy – And completely unprepared for adulthood*. New York, NY: Simon & Schuster, Inc.

University of California-Riverside. (2017). *Live fit, live well: For faculty and staff*

  employees. Retrieved from

  https://academicpersonnel.ucr.edu/sites/g/files/rcwecm1261/files/2019-

  06/wellness_program_brochure_march_2012.pdf

U.S. Department of Health and Human Services. (1999). *Mental health: A report of the*

  surgeon general. Rockville, MD: National Institute of Mental Health. Retrieved

  from https://profiles.nlm.nih.gov/ps/access/NNBBHS.pdf

Watson, A. (2018). Number of Netflix streaming subscribers worldwide from 3rd quarter

  2011 to 1st quarter 2018 (in millions). *Statista: The Statistics Portal*. Retrieved

  from https://www.statista.com/statistics/250934/quarterly-number-of-netflix-

  streaming-subscribers-worldwide/.

WHOQoL Group. (1995). The World Health Organization quality of life assessment

  (WHOQOL): Position paper from the World Health Organization. *Social Science*

  & Medicine, *41*, 1403–1409. doi:10.1016/0277-9536(95)00112-k

Wijeyesinghe, C. L., & Jackson, Bailey W., III. (Eds.). (2012). *New perspectives on*

  racial identity development: Integrating emerging frameworks (2nd ed.). New

  York, NY: New York University Press.

World Health Organization. (2015). *Public health implications of excessive use of the*

  internet, computers, smartphones and similar electronic devices. Report from the

  2015 meeting of the World Health Organization, Tokyo, Japan. Retrieved from

  http://apps.who.int/iris/bitstream/10665/184264/1/9789241509367_eng.pdf

Yoo, Y. S., Cho, O. H., & Cha, K. S. (2014). Associations between overuse of the internet and mental health in adolescents. *Nursing & Health Sciences*, *16*(2), 193–200. doi:10.1111/nhs.12086

Zheng, P., & Ni, L. M. (2006). Spotlight: The rise of the smart phone. *IEEE Distributed Systems Online*, *7*(3), 3. doi:10.1109/MDSO.2006.22

Appendix A

Survey Questions

Overall Quality of Life (final score included these questions and all other QoL survey questions):

1. How would you rate your quality of life?

2. How satisfied are you with your health?

3. How safe do you feel in your daily life?

4. How healthy is your physical environment?

5. Have you enough money to meet your needs?

6. How available to you is the information that you need in your day-to-day life?

7. How satisfied are you with your basic needs (e.g. food, water, access to health services, transportation, conditions of your living place)?

Mental Health:

8. How much does your use of medical interventions affect your overall quality of life?

9. How much do you enjoy life?

10. How often do you have negative feelings, such as blue mood, despair, anxiety, depression?

11. How well are you able to concentrate?

12. How would you rate your ability to adapt to change?

13. How would you rate your ability to cope with adversity?

14. How satisfied are you with your ability to perform your daily living activities? (Question scored for both mental health and physical health categories, but only once for overall quality of life score)

15. How would you rate your mental health?

Physical Health:

16. To what extent do you feel that physical pain prevents you from daily activities?

17. Do you have enough energy for everyday life?

18. How satisfied are you with your quality of sleep?

19. How satisfied are you with your quantity of sleep?

20. How satisfied are you with your ability to perform your daily living activities? (Question scored for both mental health and physical health categories, but only once for overall quality of life score)

21. How would you rate your physical health?

Social Health:

22. How satisfied are you with your personal relationships?

23. How satisfied are you with the support you get from those you trust most?

24. How well do you feel you belong at Taylor University?

25. How satisfied are you with the amount of time you spend with other people?

26. How would you rate your ability to communicate face-to-face?

27. How would you rate your ability to communicate through technology?

28. How often do you feel lonely?

29. How would you rate your social health?

Spiritual Health:

30. To what extent do you feel your life to be meaningful?

31. How satisfied are you with the impact your faith has on your life?

32. How satisfied are you with your overall relationship with God?

33. How satisfied are you with the time you spend reading the Bible?

34. How satisfied are you with your prayer life?

35. How satisfied are you with the time you spend talking about God with others?

36. How would you rate your spiritual health?

Appendix B

Informed Consent

TAYLOR UNIVERSITY

INFORMED CONSENT

Smartphones and their Influence on Student Quality of Life

You are invited to participate in a research study of Smartphones and Quality of Life. You were selected as a possible subject because you are a student who owns and uses a smartphone device. We ask that you read this form and ask any questions you many have before agreeing to be in the study.
The study is being conducted by Talis Rudzitis, a Taylor University MAHE Graduate Student, under the supervision of Todd Ream and in collaboration with Professor Darci Nurkkala.

STUDY PURPOSE
The purpose of this study is to explore a potential connection between a student's personal time spent on their smartphone device and their individual Quality of Life, particularly related to mental, physical, social, and spiritual health.

NUMBER OF PEOPLE TAKING PART IN THE STUDY:
If you agree to participate, you will be one of 170 subjects who will be participating in this research.

PROCEDURES FOR THE STUDY:
If you agree to be in the study, you will do the following things:
- Provide this researcher with access to your class-assigned survey** results to be used for further data analysis.

**As a reminder, the class-assigned surveys include:
- A survey reflecting on your own Quality of Life.
- Daily surveys (over a two week period) reflecting the time you spend on your smartphone and what you use your smartphone for each day

RISKS OF TAKING PART IN THE STUDY:
There are no foreseeable risks for allowing the researcher to use your survey results.

BENEFITS OF TAKING PART IN THE STUDY:

The benefits to participation in the study that are reasonable to expect are...
- Participation in a group study that may further inform you about your peers
- Participation in a group study that may allow you to learn from your peers

CONFIDENTIALITY

Efforts will be made to keep your personal information confidential. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. Your identity will be held in confidence in reports in which the study may be published and databases in which results may be stored.
This researcher will help Professor Nurkkala collect the data. Names will remain on the surveys until the research has been compiled. Those who do not wish to be counted in the data collection and formal research process will be removed from the survey lists. The remaining surveys will be compiled with their respective authors. Then, names will be removed from the files.

Organizations that may inspect and/or copy your research records for quality assurance and data analysis include groups such as the study investigator and his/her research associates, the Taylor University Institutional Review Board or its designees, the study sponsor, Todd Ream, and (as allowed by law) state or federal agencies, specifically the Office for Human Research Protections (OHRP) etc., who may need to access your research records.

COSTS

There are no known costs of participating in this study.

PAYMENT

You will not receive payment for taking part in this study.

COMPENSATION FOR INJURY

In the event of physical injury resulting from your participation in this research, necessary medical treatment will be provided to you and billed as part of your medical expenses. Costs not covered by your health care insurer will be your responsibility. Also, it is your responsibility to determine the extent of your health care coverage. There is no program in place for other monetary compensation for such injuries. If you are participating in research which is not conducted at a medical facility, you will be responsible for seeking medical care and for the expenses associated with any care received.

CONTACTS FOR QUESTIONS OR PROBLEMS

For questions about the study or a research-related injury, contact the researcher Talis Rudzitis at talis_rudzitis@taylor.edu or at 763-248-6270.

Inquiries regarding the nature of the research, his/her rights as a subject, or any other aspect of the research as it relates to his/her participation as a subject can be directed to Taylor University's Institutional Review Board at IRB@taylor.edu or the Chair of the IRB, Susan Gavin at 756-998-5188 or ssgavin@taylor.edu. Additionally, Todd Ream, the faculty advisor for this project can be contacted at todd.ream@taylor.edu or 765-998-4399.

VOLUNTARY NATURE OF STUDY

Taking part in this study is voluntary. You may choose not to allow your class-assigned survey data to be used for this study at any time. Choosing not to allow your data to be used for this study will not result in any penalty or loss of benefits to which you are entitled, nor will it affect your grade in any way. Your decision whether or not to participate in this study will not affect your current or future relations with Taylor University.

Your participation may be terminated by the investigator without regard to your consent in the following circumstances: if there is no formal way to collect your smartphone information, you are a minor, or you intentionally lied on your surveys to skew the data and it has been found out.

SUBJECT'S CONSENT

In consideration of all of the above, I give my consent to participate in this research study.

I will be given a copy of this informed consent document to keep for my records. I agree to take part in this study.

Subject's Printed Name: _____

Subject's Signature: _____

Date: _____

Printed Name of Person Obtaining Consent: _____

Signature of Person Obtaining Consent: _____

Date: _____