God and the Machine:

A Correlational Study on Mobile Phone Dependence, Religious Coping, and Mental Health

Rachel Bolme

A Senior Thesis submitted in partial fulfillment
of the requirements for graduation
in the Honors Program
Liberty University
Spring 2020

Acceptance of Senior Honors Thesis

This Senior Honors Thesis is accepted in partial
fulfillment of the requirements for graduation from the
Honors Program of Liberty University.

_____
Keith Lahikainen, Psy.D.
Thesis Chair

_____
Jichan J. Kim, Ph.D.
Committee Member

_____
James H. Nutter, D.A.
Honors Director

_____
Date

Abstract

Research on the various effects of mobile phones did not begin to be published until after they had already been integrated into society. To date, the results of various studies looking into the relationship between mobile phone use and mental health demonstrate that phones, if used in problematic ways, have negative effects on mental health. Even so, there are no studies looking into problematic mobile phone use and how it correlates with spirituality and positive religious coping as well as mental health. Due to this gap in the research, this anonymous online study was designed to look into correlations between problematic cell phone use, positive religious coping, and mental health. The Adapted Cell Phone Addiction Test (ACPAT) was used to assess problematic cell phone use, the Religious Coping Activities Scales (RCOPE) were used to assess positive religious coping, and the Depression Anxiety Stress Scales (DASS-42) were used to assess mental health.

Keywords: phone, mobile phone, problematic mobile phone use, spirituality, religious coping, mental health, depression anxiety stress scales

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The nearly meteoric advance of technology has impacted daily life in a multitude of ways, both immediately observable and not. Mobile phones, in particular, have integrated into society seamlessly, with over 95% of Americans now owning a phone (Volkmer & Lermer, 2019). For the purpose of this study, a mobile phone is defined as a portable electronic telephone device that operates wirelessly over a large area; other words used to capture the same idea include cell phone, smartphone, and the colloquial "phone" (Dictionary.com). These days, mobile phones are handheld computers and are useful for a variety of daily tasks, typically coming with a touchscreen, internet access, the capability of downloading various programs, the ability to connect with an incomprehensible number of networks and services (Boumlesh & Jaalouk, 2017; Volkmer & Lermer, 2019). Due to the rapid integration of mobile phones into daily life, it took until after these phones had already been integrated into society for research to start being published on mobile phones and their various side effects.

Understanding the Phone Problem

The public perception of how troubling regular widespread phone and internet use are has increased notably over the last decade (Carbonell, Chamarro, Oberst, Rodrigo, & Prades, 2018). This is made readily apparent by looking at news outlets such as the New York Times, filled with articles about phones with titles such as "How To Break Up With Your Phone" and "How Not To Let Your Phone Ruin Your Vacation", selling the idea that almost anyone who uses a phone suffers negative effects from it (Price, 2017; 2018). Yet the relationship between mobile phones and mental health is not as simple as news outlets portray; rather, this relationship is somewhat like the relationship between medicine and mental health.

The correct kind and amount of medicine can help those with mental health issues such as depressive disorders, anxiety disorders, bipolar disorders, schizophrenia, and so on; for these people, medicine can be a blessing and a balm. However, medicine can also become detrimental to mental health in the form of dependence, problematic use, or addiction. For example, opioids, a type of pain medicine beneficial for those recovering from different surgeries and other health issues, also have addictive properties that have caused a recent epidemic of addicted users (U. S. Department of Health and Human Services, 2018). Furthermore, even if a medicine is not chemically addictive, it can be psychologically addictive, meaning that despite a lack of a chemical or physical dependence on the drug, one may still believe one needs that medicine, due to a psychological or mental dependence (Cheatle, 2014; Fuji, Suzuki, Mimura, & Uchida, 2017).

Mobile phones are very similar. Phones are beneficial in many areas of life, such as communicating with others, facilitating group work and group planning, providing data whenever needed or desired, and connecting groups of people that would not have been connected before technology. However, phones can also become a source of dependence, or otherwise be used problematically. For example, using mobile phones to alleviate boredom is very different than using mobile phones for emotional coping; one recent study found that the first is not correlated with anxiety and depression, while the second is positively correlated with anxiety and depression (Panova & Lleras, 2016). While research has shown that using mobile phones can have both positive and negative effects, research is still in its infancy (Charman-Anderson, 2009; Panova & Lleras, 2016). Here, the negative effects of mobile phones, caused by using mobile phones in problematic manners, will be focused on.

Despite “mobile phone dependence” and “mobile phone addiction” not specifically being listed in the DSM-V, the category of “behavioral addictions” found in the DSM-V seems to cover problematic use of and dependence on mobile phones (Boumlesh & Jaalouk, 2017; Şenol Durak & Durak, 2019). Furthermore, problematic use of and dependence on phones is increasingly acknowledged as an issue in therapeutic practice and in society at large (Carbonell et al., 2018; Lanette & Mazmanian, 2018; Sapacz, Rockman, & Clark, 2016). Studies have shown that restricting phone use can cause anxiety even for mobile phone users with a healthy level of attachment to their phones (Sapacz et al., 2016). Hence, this topic concerns not just the younger generations, but the population as a whole.

Literature Review

Problematic Mobile Phone Use

Mobile phone use is considered problematic when users are unable to regulate mobile phone usage, usually resulting in excessive phone use and even symptoms of addiction (Boumlesh & Jaalouk, 2017; Elhai, Levine, Dvorak, & Hall, 2017; Volkmer & Lermer, 2019). These symptoms of mobile phone addiction can include withdrawal, compulsive behavior related to phones, continued phone use despite detrimental health effects, functional impairment related to the aforementioned addiction symptoms, and the like (Boumlesh & Jaalouk, 2017; Elhai et al., 2017; Volkmer & Lermer, 2019). Like all addictions, such behavior causes problems and distress not only for the one with the addiction or addictive behaviors, but for those around them, with friends and family often remarking on the problematic mobile phone use and claiming it gets in the way of interpersonal interaction and bonding. These symptoms of mobile phone addiction are in line with the concept of “behavioral addictions”, which is a broad diagnostic category of

behavioral issues and addictive symptoms that problematic mobile phone use could fall into (Boumlesh & Jaalouk, 2017).

The idea that mobile phones can be addictive has plenty of other merit as well, as the social media now available on such phones has been found to trigger dopamine releases similar to those of nicotine (Charman-Anderson, 2009; Erfanmanesh, & Hossseini, 2015; Salehan & Negahban, 2013). Dopamine is one of the pleasure chemicals of the brain, and so anything that causes its release can have addictive qualities—especially when that release of dopamine comes quickly and without much effort on one's own part, as is the case with nicotine. Thus, the dopamine release caused by social media entices one into chasing more of whatever caused the dopamine release; without a break from social media and the mobile phone from which social media is accessed, the repeated releasing of dopamine can trap one in a cycle of endlessly refreshing the page, seeking that next rush of happiness and pleasure (Charman-Anderson, 2009). It seems likely that this cycle caused by social media and phone use, of dopamine releases leading to cravings for more, is why multiple studies have shown that mobile phone restriction can cause withdrawal symptoms in some people—again, similar to those of nicotine (Boumlesh & Jaalouk, 2017; Charman-Anderson, 2009; Elhai et al., 2017; Eide, Aarestad, Andreassen, Bilder, & Pallesen, 2018).

These reactions that some people have to being restricted from their mobile phones, including significant anxiety or withdrawal symptoms, has led to the coining of a new term to describe this phenomenon: nomophobia. Nomophobia is an abbreviation of "no mobile phone phobia", and is defined as "feelings of discomfort or anxiety experienced by individuals when they are unable to use their mobile phones or utilize the conveniences these devices provide" (Bhattacharya, Bashar, Srivastava, & Singh, 2019, para. 1; Lee, Kim, Mendoza, & McDonough,

2018; para. 1). The term nomophobia was constructed around the definition of "phobia" as a "fear of a particular or specific thing"; however, due to its pervasiveness across situations and over time, nomophobia presents more similarly to an anxiety disorder (Bhattacharya et al., 2019, para. 2). Nomophobia also has a high rate of comorbidity with anxiety disorders and other phobias (Bhattacharya et al., 2019). Case studies with clients exhibiting "nomophobia" have a set of specific symptoms including anxiety, trembling, agitation, disorientation, respiratory alterations, and tachycardia (Bhattacharya et al., 2019). These symptoms may be due to a new mental disorder developing from mobile phones; these symptoms may also be due to other mental disorders preexisting in these users, being comorbid with nomophobia, and the symptom causes being confused. The exact causes of the symptomology defining nomophobia are yet to be discovered, due to a paucity of research in this area (Lee et al., 2018).

Another hypothesis regarding problematic mobile phone use and mobile phone addiction is that this behavior is used in an attempt to escape another more significant problem, such as boredom, low self-esteem, interpersonal troubles, and so on (Roberts, Yaya, & Manolis, 2014). This hypothesis is on the complete other side from nomophobia, as it compares problematic mobile phone use to compulsive shopping; this would make problematic mobile phone use or phone dependency a "secondary addiction", instead of the primary issue (Roberts et al., 2014). The constant focus on the present provided by mobile phones and their unlimited wireless access helps the mobile phone user avoid uncomfortable and distressing issues through a mix of escapism and the constant dopamine hits from social media (Charman-Anderson, 2009; Roberts et al., 2014).

Regardless of cause, the effects of problematic mobile phone overuse and dependence are not limited to those presenting anxiety and mobile phone withdrawal symptoms. The effects

cover much more ground than that. Not only does mobile phone dependence correlate notably with anxiety disorders and addictive symptoms, but various studies have also shown that mobile phone dependence and problematic mobile phone use are significantly associated with impulsivity, depression, lower well-being, and lower life satisfaction (Demirci, Akgonul, & Akpinar, 2015; Elhai, Levine, Dvorak, & Hall, 2016; Elhai et al., 2017; Grant, Lust, & Chamberlain, 2019; Lepp, Barkley, & Karpinski, 2014; Volkmer & Lermer, 2019). This is hardly surprising, as one of the most prevalent symptoms of problematic mobile phone use is lack of sleep, whether due to late-night smartphone use or decreased sleep quality because of smartphone use (Boumlesh & Jaalouk, 2017). Losing sleep due to this is especially concerning, as sleep is vital for proper functioning, and lack of sleep leads to lower response speed, attention deficits, anxiety, irritability, depression, emotional volatility, and the like (Kilgore, 2010; Krause et al., 2017). Sleep deprivation also has a global degrading effect on all cognitive processes, to the point where those who are chronically sleep deprived struggle with perception, memory, frustration tolerance, keeping a positive emotional outlook, and using emotions to adaptively inform decision making (Kilgore, 2010).

University students seem to be a particular target of studies regarding problematic mobile phone use—perhaps because of the ease of access to this population; perhaps because, unlike previous generations, these students have grown up with technology; or perhaps for some other reason. Regardless, this focus is not without merit, as the prevalence of mobile phone addiction symptoms is abnormally high among university students in particular; one recent study found that 20% of university students exhibit problematic phone use behavior (Boumosleh & Jaalouk, 2017). This is of particular concern, and not just because of the lack of sleep, which comes with a host of problems on its own. Problematic mobile phone use is significantly correlated with

lower GPA, independent of the variables of sleep quality and quantity (Boumosleh & Jaalouk, 2017; Lepp et al., 2014). Also, for university students in particular, various studies have found that mobile phone dependence and problematic mobile phone use are significantly associated with issues such as alcohol use and fear of missing out (Demirci et al., 2015; Elhai et al., 2016; Lepp et al., 2014).

Risk factors and predictors of mobile phone dependence and problematic mobile phone use vary across surveys and studies. However, one of the universal predictors of problematic mobile phone use is, obviously, owning a mobile phone (Charman-Anderson, 2009). A list of other risk factors and predictors of problematic mobile phone use and mobile phone dependence include frequency of use, specific application use, high stress levels, depression, social anxiety, and addictive tendencies (Boumosleh & Jaalouk, 2017; Salehan & Negahban, 2013; Sapacz, Rockman, & Clark, 2016; Lopez-Fernandez et al., 2017).

Due to the many issues correlated with problematic mobile phone use, as well as the prevalence of problematic use among university students, understanding this topic and its many related dimensions is important not just for the field of psychology, but for society at large. The ways mobile phones can affect those who use them is important information for all phone users to know—and phones are used by almost everyone. Despite the research already published on the issue of problematic mobile phone usage and its various adverse effects, there is still much research to be done as phones are still such a recent technological advancement. One area of study that has not yet been looked into is possible correlations between problematic mobile phone usage and spirituality.

Spirituality and Religious Coping

Spirituality is more often referred to in research literature as religiosity, due to the more concrete nature of this alternate term; here, however, here, spirituality and religiosity will be used interchangeably. Religiosity refers to ways of understanding and dealing with the negative events of life events that are related to the divine (Xu, 2016). This variable has many different dimensions to it, and can be assessed in many different ways; church attendance, belief salience, frequency of prayer, and so on (Leondari & Gialamas, 2009; Xu, 2016). It is difficult to pin down a specific measure of religiosity, given that this variable has so many dimensions to it. However, religious coping is one dimension of religiosity that has been studied for over 20 years, and has an entire body of research backing its reliability and validity as a measure of how well religion helps one in dealing with hardship (Pargament et al., 1990; Pargament, Feuille, & Burdzy, 2011, Wortmann, 2013; Xu, 2016). Religious coping is a good measure of religiosity because people who are higher in religiosity are more likely to use emotional regulation and coping strategies that are more adaptive and are linked to better outcomes (Vishkin, Bloom, Schwartz, Solak, & Tamir;. 2019). Furthermore, religious coping as a measure of health and well-being has been consistent across time and across diverse groups of people (Pargament et al., 2011).

Religious coping refers to coping with hardships and life's struggles by utilizing one's personal religious beliefs and religious community. Studies have shown repeatedly that, during difficult times, people turn to religion for help understanding and dealing with problems, challenges, stress, and the like (Ano & Vasconcelles, 2005; Pargament et al., 2011; Wortmann, 2013; Xu, 2016). However, the specific type of religious coping utilized to deal with an issue has direct and significant determinants on how well the issue is dealt with, as well as how prevalent

religious coping remains over time in the life of the one dealing with the aforementioned issue (Holt, Roth, Huang, Park, & Clark, 2017). If religious coping methods that have been shown to be detrimental to psychological well-being in the long term are used, studies have shown that it is likely that the person will rely less on religious coping methods (Ano & Vasconcelles, 2005; Holt et al., 2017).

There are two subtypes of religious coping: positive religious coping and negative religious coping (Wortmann, 2013). Positive religious coping refers to methods of religious coping that research has shown are positively correlated with better mental health outcomes, and negative religious coping refers to such methods that research has shown are negatively related to better mental health outcomes (Pargament et al., 2011; Wortmann, 2013). However, positive religious coping could also be so called because this method deals more with holding onto positive emotions, and negative religious coping could also be so called because this method deals more with holding onto negative emotions.

Positive religious coping methods refer to methods derived from a secure relationship with the divine, a benevolent worldview, and a sense of spiritual connectedness with others (Ano & Vasconcelles, 2005; Pargament et al., 2011). Positive religious coping is related to positive adjustment to stress and better psychological well-being outcomes (Ano & Vasconcelles, 2005; Pargament, Tarakeshwar, Ellison, & Wulff, 2002). Examples of positive religious coping include interpersonal support from one's religious circle or spiritual support group, benevolent reappraisal and reframing of the stressor, and seeking collaboration with the divine (Pargament et al., 2011). High scores on religious beliefs measurements tend to preserve positive religious coping levels over time (Holt et al., 2017).

Negative religious coping methods refer to methods derived from underlying struggles and spiritual tensions with the divine, within oneself, and with others (Ano & Vasconcelles, 2005; Pargament et al., 2011). Negative religious coping is related to negative adjustment to stress and worse psychological well-being outcomes (Ano & Vasconcelles, 2005; Pargament et al., 2002). Examples of negative religious coping include being in conflict with one's religious circle or spiritual support group, questioning, guilt, and perceived distance from the divine (Pargament et al., 2011).

Religious coping may be active or passive (Wortmann, 2013). However, regardless of the activity level, religious coping has been proven to demonstrate health and well-being far above the level of secular coping methods (Holt et al., 2017). Longitudinal studies regarding religious coping and its long-term effects need to be done to determine the effects of religious coping on various health and well-being variables over time; however, available research shows that religious coping is one of the best predictors of health and well-being (Holt et al., 2017; Pargament et al., 2011).

As for filling the gap in the research regarding possible relationships between problematic mobile phone usage and religiosity, it has been determined that religious coping is the best inventory of religiosity to use first due to three reasons: the research already done with religious coping's relationship with mental health, the goal of religious coping and its possible alignment with a hypothesized goal of problematic mobile phone use, and the ease of defining religious coping as a variable related to health (Ano & Vasconcelles, 2005; Pargament et al., 2002; Pargament et al., 2011).

First, religious coping is one of the dimensions of religiosity with a sizable body of research regarding its relationship with mental health (Ano & Vasconcelles, 2005; Pargament et

al., 2002; Pargament et al., 2011). Positive religious coping has been shown to have positive effects on health, depression, stress, and overall psychological well-being (Holt et al., 2017; Pargament et al., 2002). Another reason is that the goal of religious coping is to alleviate distress (Ano & Vasconcelles, 2005). Thus, if the hypothesis of problematic cell phone use that states that the goal of such use is to avoid distress through escapism and dopamine hits, then the two behaviors have the same underlying goal. This makes them good variables to measure against the same mental health scale, as both behaviors are working toward the same outcome, whether consciously or not. Finally, religious coping is a concrete dimension of behavior that is easy to measure (Pargament et al., 2011). Religious coping is the type of variable where a person can be asked about their thoughts and behaviors surrounding a subject in a concrete and factual manner (Pargament et al., 1990). Thus, the likelihood of getting skewed data due to emotionally charged language or such similar problematic confounders is lowered. This is extremely important as, for a study to be reliable and valid, the inventories that compose that study must also be reliable and valid.

For the reasons of religious coping already having a sizable amount of research regarding this variable's relationship with mental health, religious coping and its possible alignment with a hypothesized goal of problematic mobile phone use, and religious coping being simple to define as a variable, positive religious coping was chosen as the variable with which to measure religiosity for this study.

The Current Study

The research literature shows that problematic mobile phone usage is linked to a number of negative outcomes, including mental health problems, higher depression, higher anxiety, lower GPA, impulsivity, less sleep, and lower overall well-being (Bhattacharya et. al., 2019;

Demirci et al., 2015; Elhai et al., 2016; 2017; Grant et al., 2019; Lepp et al., 2014; Volkmer & Lermer, 2019). The research literature also shows that overall, positive religious coping is linked to higher health and overall well-being (Ano & Vasconcelles, 2005; Holt et al., 2017; Pargament et al., 1990; 2002; 2011; Wortmann, 2013).

However, there was a notable dearth of research on how the advanced technology of today and religion interact—especially with regards to mental health problems. As the place and purpose of both technology and religion are relevant issues in society today, this dearth of research points to multiple unanswered questions. Would exhibiting higher positive religious coping correlate with less problematic mobile phone usage? Would it be possible to create a better predictor of mental health by combining the correlational relationships each of these variables has with mental health? Thus, a study was formed to investigate these questions.

Given the literature review, the hypotheses in this study were as follows: 1) problematic mobile phone usage would be positively correlated with mental health problems and issues, 2) positive religious coping would be negatively correlated with mental health problems and issues, and 3) the combined predictive ability of problematic mobile phone usage and positive religious coping would predict mental health problems better than either of these assessments alone.

Methods

To investigate possible correlations between problematic mobile phone usage, positive religious coping, and mental health, a correlational research study was designed using several established scales. The study was delivered anonymously online, for the convenience and protection of the participants. The data from the study was then evaluated using SPSS to determine possible relationships and predictive ability between variables.

Participants

The participants for this study were volunteering undergraduate and graduate students of at least 18 years of age enrolled in a private Christian university in the southeastern United States. This research being conducted at a specifically Christian university means that the participant sample was expected to be suited well for studying how spirituality correlates to the issue of problematic cell phone use and its associated problems, as, given the religious nature of the institution, more participants were likely to score above minimally on the positive religious coping measurement.

The original sample size for this study was 198 participants; however, after removing all respondents who did not fit the requirements for participation due to age or graduation or who did not fully complete the study, the sample size dropped to 143 participants. Of these 143 participants, the vast majority were female, with 126 (88.1%) reporting as "Female" and 16 (11.2%) reporting as "Male"; one participant (0.7%) reported gender as "Other". Also, most participants reported race and ethnicity as "White/ Caucasian" (85.3%) or partially so (4.9%). Other data shown for race and ethnicity included "Asian" (4.9%), "Black/ African American" (3.5%), "Hispanic/ Latino" (3.5%), "American Indian/ Alaska Native" (2.1%), and "Other" (0.7%).

Measures

The study used several established scales to survey the dimensions of problematic mobile phone use, spirituality in the form of positive religious coping, and mental health (Lovibond & Lovibond, 1995a, 1995b; Pargament et al., 1990; Smetaniuk, 2014).

Adapted Cell Phone Addiction Test. The survey chosen to measure problematic mobile phone use was the Adapted Cell Phone Addiction Test (ACPAT) (Smetaniuk, 2014). This

inventory was chosen because it assesses problematic mobile phone use using concrete questions asking how phone use is affecting everyday life or getting in the way of necessary tasks, instead of using negative language and addiction terms in the inventory or asking participants to self-report mobile phone use with a single number.

The ACPAT is an inventory with 20 items, measuring problematic mobile phone use on a 5-point Likert scale; each item is measured from 1 “Rarely” to 3 “Frequently” to 5 “Always” (Smetaniuk, 2014). The ACPAT assesses preoccupation with one’s mobile phone, excessive use, anticipation for when one can use the phone, neglecting work and social life in favor of mobile phone use, and lack of control regarding phone use (Beison & Rademacher, 2017; Smetaniuk, 2014).

This inventory has an internal consistency score of 0.93, measuring by Cronbach’s alpha (Smetaniuk, 2014). While the Adapted Cell Phone Addiction Test (ACPAT) is a newer survey, it has been well developed, and multiple studies support its reliability and validity (Beison & Rademacher, 2017; Şenol Durak & Durak, 2019; Smetaniuk, 2014).

Religious Coping Activities Scales. As it is difficult to measure the dimension of “spirituality” due to its broadness, the specific subset of positive religious coping was chosen as an assessment of spirituality instead. Thus, the survey chosen to measure spirituality in the form of measuring positive religious coping was the Religious Coping Activities Scales (RCOPE) (Pargament et al., 1990). This inventory was chosen for multiple reasons, but mostly because research has shown religious coping to be a good indicator of overall spirituality (Kvande, Klöckner, Moksnes, & Espnes, 2015; Pargament et al., 2011).

The RCOPE is an inventory with 29 items, measuring positive religious coping on a 4-point Likert scale; each item is measured from 1 “Not at all” to 4 “A great deal” (Pargament et

al., 1990). This inventory assesses positive religious coping by measuring the interconnected variables of spiritually based coping, doing good deeds, relying on interpersonal religious support, pleading with God, religious avoidance—that is, avoiding the problem by focusing on spirituality or religion—and discontent, which is included as a measure of negative religious coping but thus is measured inversely (Pargament et al., 1990).

Each of the subscales of the RCOPE has an internal consistency score of greater than 0.70, measuring by Cronbach's alpha (McConnell, Trevino, & Klinger, 2011; Pargament et al., 1990). The Religious Coping Scales (RCOPE) was chosen because it is an established inventory, with multiple studies backing its reliability and validity (Kvande et al., 2015; McConnell et al., 2011; Pargament et al., 1990).

Depression Anxiety Stress Scales. The survey chosen to measure overall mental health by assessing the dimensions of depression, stress, and anxiety, was the Depression Anxiety Stress Scales (DASS-42) (Lovibond & Lovibond, 1995a; 1995b). This inventory was chosen because it concisely measures three dimensions of overall mental health using clear questions that do not take much reflection or invite second-guessing.

The DASS-42 is an inventory with 42 items and 3 subscales measuring depression, anxiety, and stress; it can be used as a comprehensive examination of mental health problems, or the each subscale can be used independently to measure depression, anxiety, and stress, respectively. The DASS-42 is measured on a 4-point Likert scale; each item is measured from 1 "Did not apply to me at all" to 4 "Applied to me very much or most of the time" (Elhai et al., 2018; Lovibond & Lovibond, 1995a; 1995b). While the subscales have the same amount of questions and thus are scored in the same manner, the subscales do not overlap in their items: for the depression subscale, items included statements such as "I couldn't seem to experience any

positive feeling at all"; for the anxiety subscale, items included statements such as "I felt I was close to panic"; and for the stress subscale, items included statements such as "I found it hard to wind down".

The internal consistency of the Depression Anxiety Stress Scales is a score of 0.92, measuring by Cronbach's alpha (Vasconcelos-Raposo, Fernandes, & Teixeira, 2013). The Depression Anxiety Stress Scales (DASS-42) has a large body of research covering many different dimensions in the field of psychology supporting the inventory's reliability and validity (Crawford & Henry, 2003; Elhai et al., 2018; Dahm, Wong, & Ponsford, 2013; Višnjić et al., 2018).

Results

For analysis of the data, Pearson's correlation was used to evaluate the possible correlations between the scales. It was determined that the underlying assumptions were met well enough to run this analysis (McCormick & Salcedo, 2015).

Evaluation of Correlation between ACPAT Scores and DASS Scores

These correlations showed that the ACPAT scores of the students (M = 37.06, SD = 11.341, N = 143), showing problematic mobile phone usage, and the DASS scores of the students (M = 66.37, SD = 17.824, N = 143), showing overall mental health by evaluating the severity of the variables of depression, anxiety, and stress, had a positive correlation. As problematic mobile phone usage increases, so do mental health problems (see Figure 1).

According to Pearson's correlation, the ACPAT scores and the DASS scores had a statistically significant linear relationship ($p < 0.001$) that was moderate in magnitude or strength ($0.3 < | r = 0.387 | < 0.5$). The ACPAT was also shown to be significantly correlated to each of the individual subscales of the DASS. Pearson's correlation showed statistical significance for

the depression subscale ($p = 0.009$, $r = 0.218$), for the anxiety subscale ($p < 0.001$, $r = 0.312$), and for the stress subscale ($p < 0.001$, $r = 0.406$).

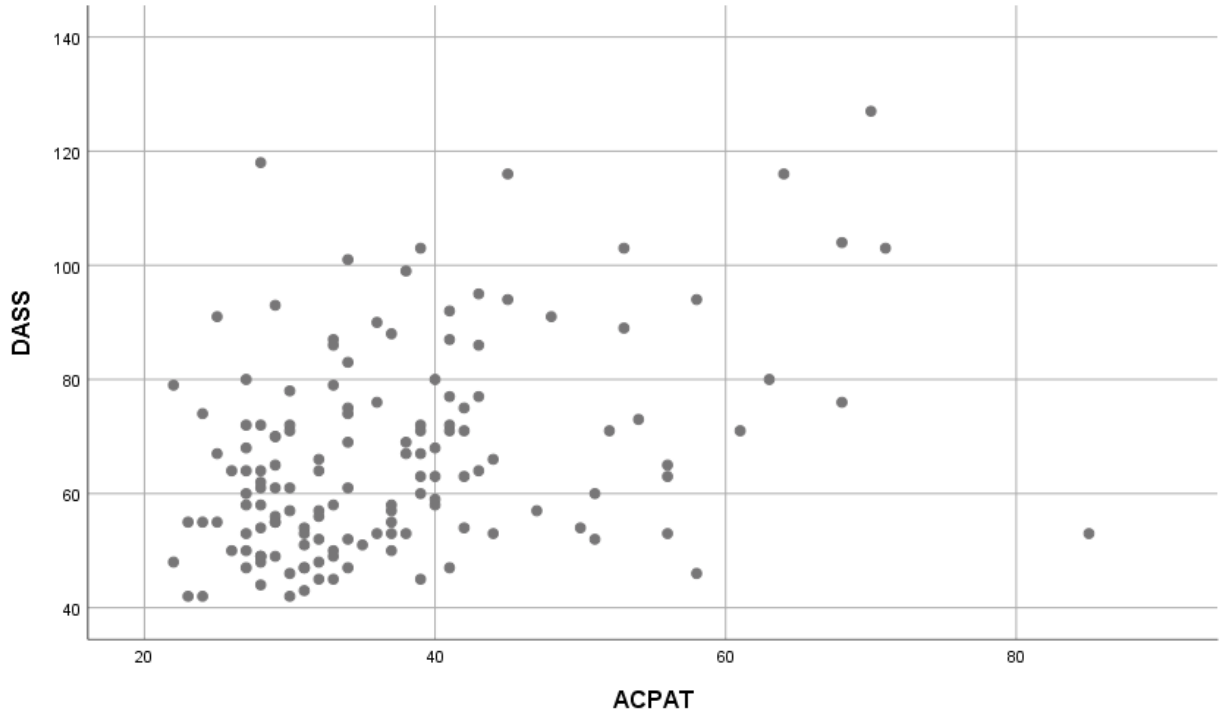

Figure 1. Scatterplot showing ACPAT scores and DASS scores.

Evaluation of Correlation between RCOPE Scores and DASS Scores

These correlations showed that the RCOPE scores of the students ($M = 80.22$, $SD = 16.151$, $N = 143$), showing positive religious coping, and the DASS scores of the students ($M = 66.37$, $SD = 17.824$, $N = 143$), showing overall mental health by evaluating the variables of depression, anxiety, and stress, had a negative correlation. As positive religious coping scores increase, mental health problems decrease slightly (see Figure 2).

According to Pearson's correlation, the RCOPE scores and the DASS scores had a statistically significant linear relationship ($p = 0.035$) that was weak in magnitude or strength ($0 < | r = -0.177 | < 0.3$). The RCOPE also showed to have different correlations to the individual

subscales of the DASS. For the depression subscale, Pearson's correlation ($p < 0.001$, $r = -0.294$) showed a statistically significant negative correlational relationship with the RCOPE scores. For the anxiety subscale, Pearson's correlation ($p = 0.865$) showed that the RCOPE does not have a statistically significant relationship with this subscale; there is no correlation. For the stress subscale, Pearson's correlation ($p = 0.139$) showed no statistically significant correlation with this subscale either; again, there is no correlation. Overall, this means that the weaker relationship shown for the RCOPE and the overall DASS may result from the confounding factor of the RCOPE only having a statistically significant relationship to the depression subscale of the DASS.

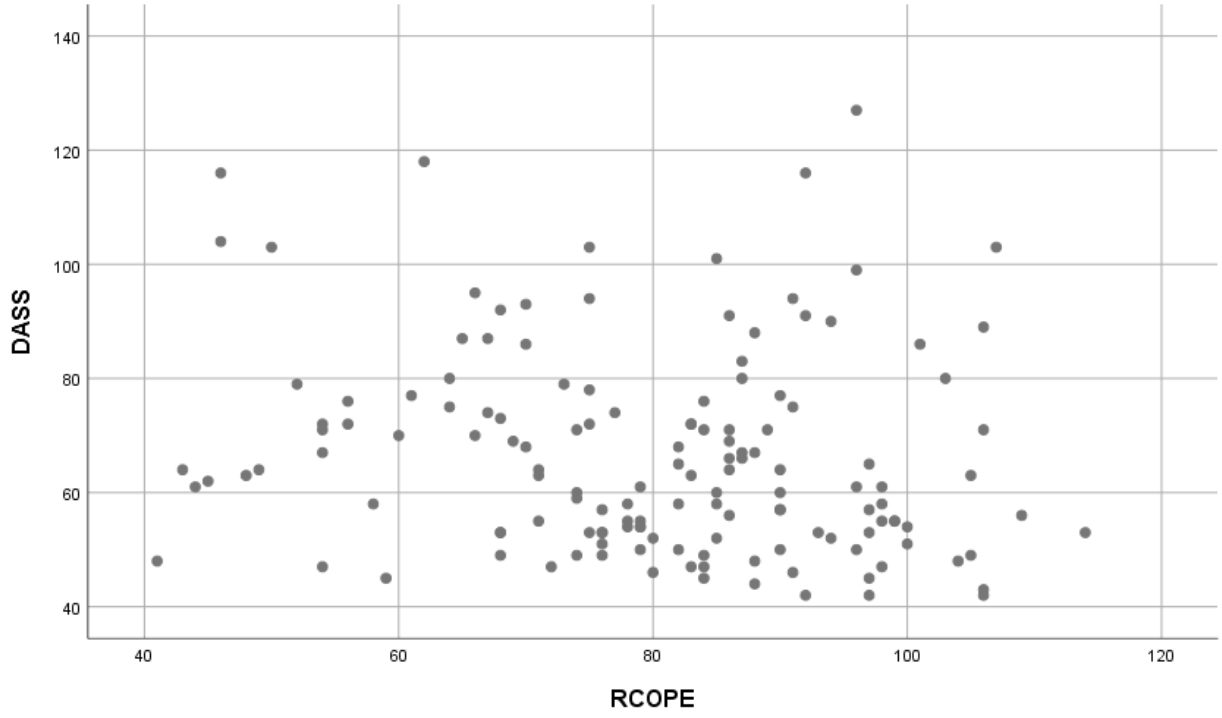

Figure 2. Scatterplot showing RCOPE scores and DASS scores.

Evaluation of Correlation between ACPAT Scores and RCOPE Scores

According to both Pearson's correlation (p = 0.253), the ACPAT scores and the RCOPE scores had no correlation (see Figure 3).

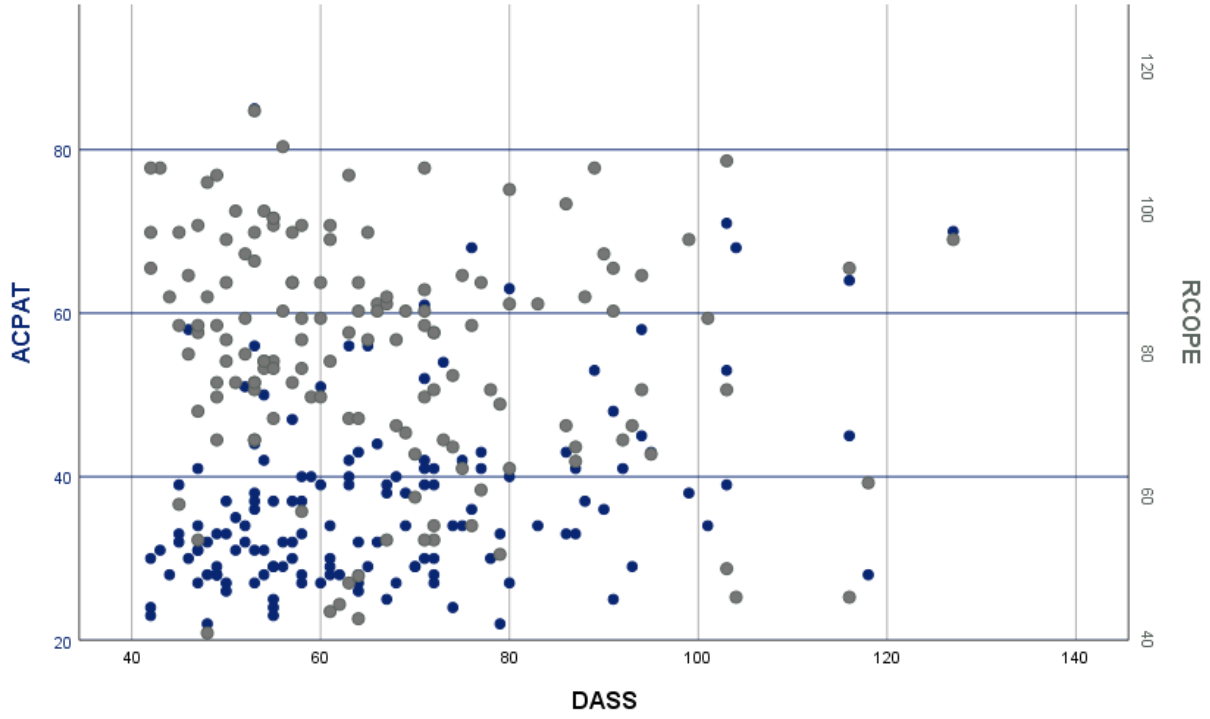

Figure 3. Scatterplot showing DASS Scores, and correlated ACPAT scores and RCOPE scores.

Evaluation of Combined Predictive Ability

To evaluate the combined predictive ability of problematic mobile phone use and positive religious coping, in the form of ACPAT scores and RCOPE scores, on mental health, in the form of DASS scores showing mental health issues, a multiple regression was run (see Figure 4). Both the entire inventory of the ACPAT and the entire inventory of the RCOPE were used, as this is both the best way to evaluate the given data, and the way in which these inventories are delivered. The multiple regression showed statistical significance for the combined predictability of the ACPAT and the RCOPE ($p < 0.001$, $R^2 = 0.196$); the beta for the ACPAT was 0.407, and

the beta for the RCOPE was -0.238. Thus, more of the variance in correlational predictability was accounted for than in using either the ACPAT or the RCOPE alone to predict overall mental health.

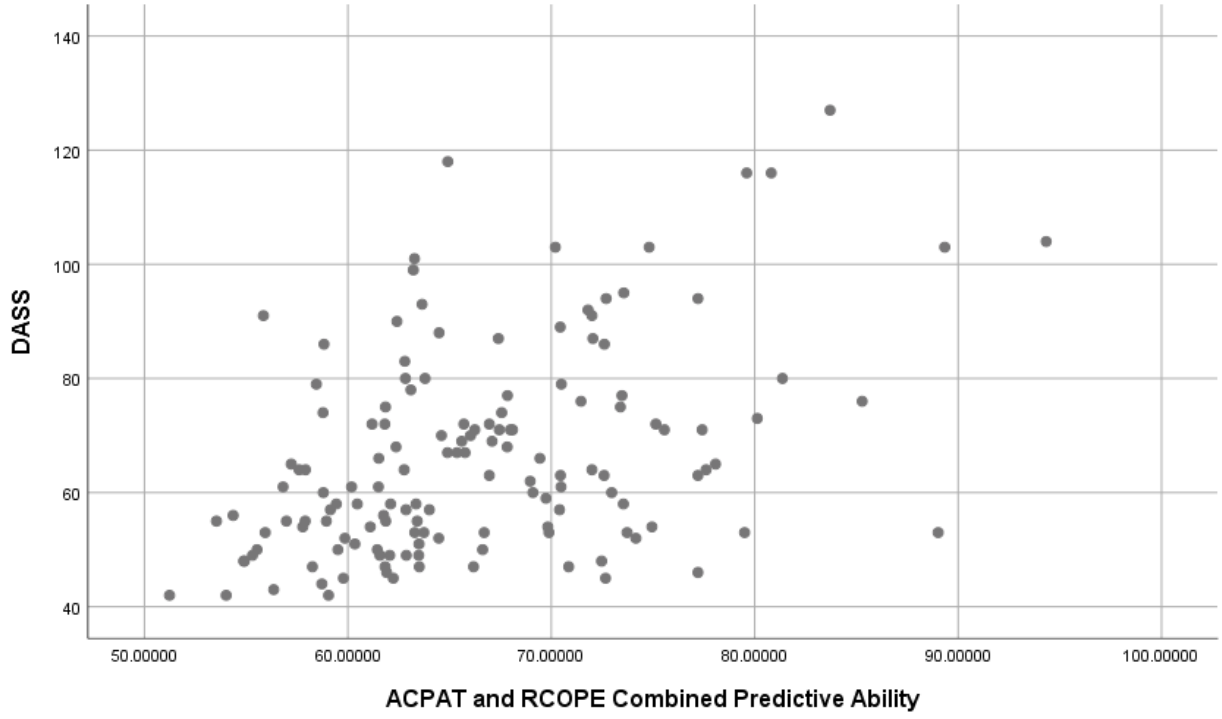

Figure 4. Scatterplot showing the combined predictive ability of ACPAT scores and RCOPE scores for DASS scores (Gignac, 2016).

Discussion

The positive relationship between problematic mobile phone usage and mental health problems, as shown by the significant positive correlation between the Adapted Cell Phone Addiction Test (ACPAT) and the Depression Anxiety Stress Scales (DASS), leave various topics open to discussion and further research. For example, what is the cause or what are the causes behind this relationship? On the one hand, having worse mental health may lead people to more problematic mobile phone usage in an attempt to cope. On the other hand, more problematic

mobile phone usage, as a result of personal traits or habits, may lead to worse mental health. Furthermore, both could be true, these factors feeding into each other in a vicious cycle. Given that this study is merely correlational in nature, there is no way to know for certain the direction of this relationship.

The negative relationship between positive religious coping and mental health problems, as shown by the significant negative correlation between the Religious Coping Scales (RCOPE) and the Depression Anxiety Stress Scales (DASS), are in line with past findings and invite further future research into gathering quantitative data regarding this phenomenon.

The lack of correlation between the ACPAT scores and the RCOPE scores shows that there is no relationship, correlational or otherwise, between problematic cell phone usage and positive religious coping. The importance of these two variables together is only shown in reference to and influence of other, third variables of importance, such as mental health or overall well-being.

Limitations

This correlational study had multiple limitations. For this study, the sampling method used was convenience sampling, the sample size used was under 200 participants, the survey method used was self-report, and the study itself was correlational; all of these have limitations and impede the generalizability of the study.

Convenience sampling, as employed by this study, means that the resultant data from the sample may have problems with generalizability, as the sample is not randomly selected and thus is most likely not representative of the population at large. For example, the fact that over 85% of the sample was female limits generalizability to males, given that females only make up approximately half of the greater population. Also, the fact that over 90% of participants reported

race and ethnicity as partially or wholly “White/ Caucasian” also causes problems for generalizability, as this is not the demographic percentage seen in the general population of college students. Furthermore, this study was conducted using participants of students from a private Christian university, which is decidedly not a place representative of the general population of college students to draw a sample from; despite such a population being helpful in measuring use of positive religious coping, the sample being drawn from a private Christian university likely did not include those from other religions, such as Islam or Hinduism, who would use positive religious coping as well.

The sample size used also causes problems for generalizability of the data. Having a sample size of fewer than 200 participants, while acceptable, is still a notably small sample for an anonymous online survey. Having a larger sample size would provide more robust data and make generalizability to the larger population easier.

As for the study itself, the survey method used was self-report. This is a limitation for this study, as participants may have not been entirely honest with their answers to look better or to make themselves feel better about themselves. The study was anonymous in an attempt to mitigate this issue and encourage more transparency; however, there is no telling how well anonymity worked to mitigate this issue, and how much of the data is skewed by self-perception or the desire to make oneself appear better than one truly is.

Finally, the study method used was correlational. This makes determining the nature of relationship between variables impossible, due to the limitations of correlational studies. Furthermore, correlations themselves may have confounding variables undetected by the scope of the research, especially correlational studies focusing on habits, such as this one. For example, certain types of people may take up certain habits, such as problematic mobile phone usage or

dedicated religious behavior, due to innate personal traits. Or, certain types of people may be more prone to mental health problems due to genetics, skewing the dependent data. This limitation links back to the sampling method used: voluntary sampling. Using this sampling method makes it nigh impossible to counter possible confounding variables.

Suggestions for Further Research

Despite its limitations, this study is a start to researching correlations between problematic mobile phone use, positive religious coping, and mental health. This study has given insight into the possible relationships between these variables, providing valuable data for future studies. However, there is still a notable dearth of research as to the various effects of cell phone use and dependence, and specifically as to how these relate to different measures and dimensions of spirituality. This is only one study, and many more are needed to adequately fill the gap in the research.

Future studies could look further into correlations between various aspects of problematic mobile phone use, spirituality, and mental health. Using different samples, sampling methods, and survey methods to gather data on religiosity in correlation with problematic mobile phone use and mental health would provide more valuable information about not just mobile phones but also about how religiosity works as a concept. Future studies could also use different scales, inventories, and assessments to evaluate these variables. Using different assessments of problematic mobile phone use, positive religious coping, and mental health than the ones used in this study would give a more robust and comprehensive view on the relationships between these variables.

Furthermore, future studies could investigate causation between problematic mobile phone use, positive religious coping, and mental health. This would serve to determine the

directions of the various relationships between these variables and to see if increases in problematic mobile phone use or mobile phone dependence have any significant and provable effects on mental health and religiosity, in their various dimensions.

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