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The Smartphone Addiction Measure

Taylor Bradish

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THE SMARTPHONE ADDICTION MEASURE

by

TAYLOR BRADISH

(Under the Direction of Janie H. Wilson)

ABSTRACT

Due to the multifaceted capabilities of the smartphone, college students have become increasingly susceptible to the overuse of and addiction to smartphone use. This susceptibility has led to many negative effects both mentally and physically in addition to the creation of new pathologies. There are many scales to measure cellphone addiction; however, scales to measure smartphone addiction in particular are scarce and have limitations that call into question their validity and reliability, especially for use on U.S. college students. This study aimed to investigate the validity and reliability of a diagnostic tool to measure smartphone addiction in U.S. college students. We aimed to account for the limitations that were present in previous scales and to further the support of smartphone addiction as a valid diagnosis that should be recognized by reputable resources. We found the Smartphone Addiction Measure to be reliable across time in addition to having internal consistency. Additionally, the evaluation of construct validity through the use of positive and negative correlations indicated support for a valid measure. This study provided a new smartphone addiction measurement tool that may allow for a way to clinically diagnosis addiction among college students.

INDEX WORDS: Smartphone, Smartphone addiction, Behavioral addiction, Cellphone, Smartphone addiction scale

THE SMARTPHONE ADDICTION MEASURE

by

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B.S., University of Georgia, 2018

B.A., University of Georgia, 2018

A Thesis Submitted to the Graduate Faculty of Georgia Southern University
in Partial Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE

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CHAPTER 1

INTRODUCTION

Addiction has been defined by the American Society of Addiction Medicine (2011) as a “chronic disease of brain reward, motivation, memory and related circuitry” (p.1), which is characterized by a person’s inability to abstain from use, impairment in behavioral control, lack of recognition of problems with behaviors and interpersonal relationships, and emotional response dysfunction. Addiction typically is discussed as it relates to drug use, but the language of addiction can also pertain to a variety of stimuli, including cellphone use.

The concept of addiction in relation to cellphone and smartphone use is not a new phenomenon, with several researchers who have explored this phenomenon (e.g., Carbonell et al., 2018; De-Sola Gutiérrez et al., 2016; Jenaro et al., 2007; Kwon et al., 2013; Lopez-Fernandez et al., 2017; Roberts et al., 2014; Smetanuik, 2014; Tossell et al., 2015). Within the literature, “cellphone” and “smartphone” has been used interchangeably, but specifically, smartphones are simply cellphones that have advanced capabilities such as the ability to download and use apps and access to the internet (Smith, 2011). In the past, cellphone addiction has been categorized as problematic cellphone or smartphone use (Carbonell et al., 2018; Jenero et al., 2007; Lopez-Fernandez et al., 2017; Smetanuik, 2014). The addictive nature of cellphones is characterized along the lines of a behavioral addiction, a disorder with symptoms behaviorally expressed, and associated with a pleasurable and irresistible quality (Black, 2013).

According to Griffiths (1996), a behavior must fulfill six criteria in order to be considered an addiction: salience, mood modification, tolerance, withdrawal, conflict, and relapse. Many researchers see these as the core components of behavioral addiction (De-Sola Gutiérrez et al., 2016; Jenaro et al., 2007; Roberts et al., 2014; Smetaniuk, 2014). However, behavioral addictions have not been universally accepted within some reputable sources, including the Diagnostic and Statistical Manual of Mental Disorders, Version 5 (DSM-5). With the exception of gambling addiction, the DSM-5 fails to elaborate on behavioral addictions due to the lack of sufficient peer-reviewed evidence to establish diagnostic

criteria (American Psychiatric Association, 2013). This lack of inclusion of behavioral addictions has led to much criticism as well as a call for more research into and treatment of behavioral addictions (Hajela & Love, 2017). Regardless of the lack of pervasive acceptance of behavioral addiction, for the purposes of the current study we assumed that behavioral addiction exists.

Addiction to cellphones, and addiction to smartphones in particular, has gained research interest for this reason and a number of additional reasons. First, due to the steady increase in smartphone users within the past decade, there are now approximately 257.3 million smartphone users in the United States as of 2018 (Holst, 2018). Second, some researchers have proposed new pathologies such as nomophobia (no mobile phone phobia), textaphrenia (people thinking they hear a text or feel a vibration indicating a message coming in when there is not one), textxiety (an anxious feeling of not sending/receiving texts), post-traumatic text disorder (mental and physical injuries due to texting), and binge texting (Nehra et al., 2012; Taneja, 2014; Verma et al., 2014). Third, smartphones are of scientific interest due to the risks associated with using them; for example, using them while driving (e.g., Bradish et al., 2019; Nikerson et al., 2008).

It should come as no surprise that cellphones are a vital part of everyday life for most college students, functioning as a tool for such goals as social interaction, information retrieval, and entertainment. According to the findings from the Pew Research Center (2019), among young adults ages 18-29, 99% own a cellphone, with 96% owning a smartphone. Although smartphone availability allows instant gratification, it comes at a price. College students spend an excessive amount of time on their cellphones, with one study indicating that college students spend nearly 9 hours on the phone daily (Roberts et al., 2014). In fact, higher phone use has been associated with lower grades, perhaps in part because college students use their phones while in class (Bjornsen & Archer, 2015; Jacobsen & Forste, 2011; Lepp et al., 2014; Lepp et al., 2015; Li et al., 2015). Cellphone use also affects the mental and physical health of college students. Although not defined by the researchers, excessive cellphone use leads to poorer sleep quality (Fossum et al., 2014; Li et al., 2015), increased levels of anxiety, lower life

satisfaction, (Lepp et al., 2014), headaches, irritability, and lack of concentration (Acharya et al., 2013), just to name a few.

Many researchers have postulated why college students are showing signs of smartphone addiction. One prominent idea is that students are showing these symptoms due to the fear of missing out (FOMO). FOMO moderately relates with smartphone use frequency ($r = .42, p < .001$) and significantly relates to problematic cellphone use ($r = .51, p < .001$), such as dependence or withdrawal when not using a smartphone (Elhai et al., 2018; Wolniewicz et al., 2018). The abundance of information students might be missing expanded exponentially with advanced capabilities of smartphones, such as internet connectivity and access to social networking sites (Kwon et al., 2013). In fact, diverse usage may lead to more specific addictions, such as social networking site addiction (Liu & Ma, 2018) or internet addiction (Chak & Leung, 2004). It is highly likely that expanded uses of smartphones contribute to the potential for addictive behaviors.

The allure of discovering what constitutes cellphone addiction has been widespread. Currently over 18 scales have been created to identify the possible psychological variables that may underlie addiction to cellphones. Given the expanded functions of smartphones over cellphones and the likelihood that smartphones exacerbate symptoms of addiction, we begin by making a distinction between the two types of phones. Our review focuses on scales designed to assess smartphone addiction specifically. Existing assessments of smartphone addiction include four scales (De-Sola Gutierrez et al., 2016): the Smartphone Addiction Inventory (SPAI; Lin et al., 2014), Smartphone Addiction Questionnaire (SPAQ; Al-Barashdi et al., 2014), Smartphone Addiction Measurement Instrument (SAMI; Tossell et al., 2015), and the Smartphone Addiction Scale (SAS; Kwon et al., 2013).

The SPAI is a 26-item self-report measurement used to identify smartphone addiction (Lin et al., 2014). Each item is rated on the following 4-point Likert Scale: 1 = strongly disagree, 2 = somewhat disagree, 3 = somewhat agree, and 4 = strongly agree. Scale items offer good face validity; however, we note some potential limitations. First, the male to female ratio for the study was highly disproportionate,

with 260 male participants and only 23 female participants. The authors rationalized this disproportionate population by arguing that male college students are at higher risk for substance and internet addiction. We propose that although male college students may be at higher risk for these types of addictions that does not necessarily mean that they are also at higher risk for smartphone addiction. Second, their sample was recruited from only the electrical engineering and department of computer and communication engineering at two Taiwan universities (Lin et al., 2014). Again, this demographic is limiting the variability and generalizability of their sample and, by extension, the generalizability of their scale. Third, the scale was created primarily through modifying the Chen Internet Addiction Scale by switching terms from “internet” to “smartphone” (Lin et al., 2014). Though internet accessibility is likely one of the many aspects of smartphone addiction, that does not necessarily mean that smartphone addiction represents the same construct. As a result, a modified internet addiction scale may fail to fully assess aspects of smartphone addiction. The authors established internal consistency by finding a Cronbach’s alpha of 0.94 for the total scale, and a two-week test-retest of the SPAI and its subscales revealing a reliability of 0.80 to 0.91. However, the authors failed to establish construct validity, which calls in to question the validity of the scale as measuring the construct of interest.

The Smartphone Addiction Questionnaire (SPAQ) is a 39-item questionnaire to measure the level of smartphone addiction a person may possess (Al-Barashdi, Bouazza, & Al Zubaidi, 2014). The questionnaire consists of 3 parts: level of smartphone usage (5 open-answer questions), level of addiction to smartphones’ different activities and applications (17 items), and the level of appearance of smartphone addiction symptoms (17 items). This questionnaire has a number of limitations. First, the 140-student sample had a disproportionate gender ratio, with 37.1% males and 62.9% females. Second, the translation to English is not completely coherent. For example, one of the items states “More than once I have been in trouble because I didn't switched on my smartphone during lectures.” Third, the authors performed a *t*-test examining potential gender differences in smartphone addiction as a measure of construct validity. We would argue that gender differences do not establish construct validity. Finally, the authors reported

construct validity with a positive correlation between their scale and the SAS (described below); however, this correlation was the only attempt to establish construct validity.

The SAMI is a 15-question survey used to evaluate smartphone addiction (Tossell et al., 2015). Participants respond to the questions using a 5-point Likert scale that ranges from never (1) to always (5). This measurement is currently the only scale that has been developed in the United States to measure smartphone addiction; however, the scale has several limitations. First, this instrument was merely created as a tool to measure smartphone addiction in the authors' study and was not the focus of their research. Consequently, the instrument was not validated. The authors modified the smartphone addiction survey after combining two other scales: the Cellular Phone Addiction Scale (CPAS) and the Internet Addiction Test (IAT; Tossell et al., 2015). Furthermore, the authors did not assess test-retest reliability of the scale in their study. Finally, the study consisted of a population of only 34 university students, which is a small sample considering the development of a unique measurement tool.

The Smartphone Addiction Scale (SAS) is a 48-item measure of smartphone addiction (Kwon et al., 2013). This scale is comprised of 6 subscales: daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse, and tolerance. Items are rated on a 6-point Likert scale ranging from strongly disagree (1) to strongly agree (6). The SAS is useful because it was devised specifically for smartphones and does not include internet addiction, per se. However, the authors pointed out limitations. They mentioned that their sample was small with 214 adult participants from two companies and two universities in South Korea and ages ranging from 18-53 ($M = 26.06$, $SD = 5.96$; Kwon et al., 2013). There was also a disproportionate gender ratio of 133 females in comparison to the 64 males. To establish construct validity with positive correlations, the authors used the K-scale, Y-scale, and the Visual Analogue Scale. However, we should note that the K- and Y-scales are measures of internet addiction, likely one component of a broader smartphone addiction construct. The Visual Analogue Scale evaluated the participants' thoughts of the seriousness of their addiction. Though the sample size and disproportionate gender ratio are limitations, the authors were able to establish construct validity through positive correlations with the K-scale, Y-scale, and the Visual Analogue Scale, as well as internal

reliability with a Cronbach's alpha of 0.97. Similar measures beyond internet addiction were not assessed, and the authors failed to include dissimilar scales (negative correlations), limiting convergence on construct validity.

The SAS has been the most influential of the four key smartphone addiction instruments reviewed here. Among all of these instruments specifically measuring smartphone addiction, only the SAMI has focused on university students in the United States, and that scale has limitations, as explained above. Based on existing scales for smartphone addiction, this area of research would benefit from the creation of a scale for a key demographic; namely, college students in the United States, as well as a thorough assessment of the resultant scale's reliability and validity.

Our goal in the present study was to create a smartphone addiction scale for university students in the United States, where 99% of young adults ages 18-29 own a cellphone, with 96% of those owning a smartphone (Pew Research Center, 2019), and assess the reliability and validity of the scale. The scale was created to address many of the aforementioned limitations found in the previous smartphone addiction scales. First, we created a smartphone addiction scale that could apply to the population in the U.S. The current scale of choice for smartphone addiction is the Smartphone Addiction Scale (SAS), which was developed in South Korea (Kwon et al., 2013). Though this scale has been widely used, we must take into account that what may constitute smartphone addiction in one culture may be different in another. Due to this, data obtained from international students and recent immigrants to the U.S. were excluded from our analyses. The United States stands out from other countries in numerous ways. U.S. residents are considered the most individualistic people in the world (Henrich et al., 2010). In comparison to other industrialized Western countries specifically, U.S. citizens are also seen as the most optimistic and patriotic people in the world, but with the highest divorce rate, longest work hours, and lowest relational focus in work settings (Henrich, Heine, and Norenzayan, 2010).

Second, we created a scale that specifically focuses on smartphone addiction in college students. The college-educated population in the U.S. differs from the non-college educated population in the U.S.

in a number of ways. They score higher on certain aspects of individualism, such as self-actualization, uniqueness, and locus of control, they are less likely to conform than non-college-educated U.S. citizens, and their moral reasoning occurs due mostly to autonomy, in comparison to non-college educated citizens whose moral reasoning is more likely to come from community and divinity (Henrich et al., 2010). U.S. college students are, in comparison to non-college educated Americans, also more favorable toward other societal groups, more supportive of racial diversity, and more motivated to explain away negative intergroup attitudes (Henrich et al., 2010).

Lastly, most of the previous scales established construct validity by assessing only scales assumed to positively correlate with the new measure, and the focus was on internet addiction. To establish a scale with an extensive assessment of validity, we examined construct validity using both similar scales (only one of which ties to internet addiction) and dissimilar scales to converge on our concept of smartphone addiction. We believed such a thorough examination of construct validity, as well as measures of reliability, would reveal the usefulness of a measure of smartphone addiction among U.S. college students.

The creation of this scale had three phases: 1) item construction, 2) factor analysis, and 3) assessment of the validity and reliability of the scale. Item construction came directly from U.S. college students rather than a modification of existing scale items. Factor analysis revealed useful items that remained in the Smartphone Addiction Measure (SAM) as well as identified items that load to specific subscales. The third and final phase of the scale creation assessed the reliability and validity of the scale. The current study covers this final phase. We planned to establish validity by assessing the construct validity of the scale in numerous ways, including measuring several similar and dissimilar constructs. We also planned to assess the reliability of the scale by using a test-retest design and evaluating Cronbach's alpha.

We expected to establish construct validity of the SAM through positive correlations with the Smartphone Addiction Scale (SAS), the Internet Addiction Test (IAT), and the subscales of the Short Urgency, Premeditation (lack of), Perseverance (lack of), Sensation Seeking, Positive Urgency, Impulsive Behavior Scale (SUPPS-P). We also expected to establish construct validity of the SAM through negative correlations with Rotter's Locus of Control Scale (LOC), the Connectedness to Nature Scale (CNS), and the Big Five Inventory (BFI), specifically in reference to conscientiousness. Lastly, we aimed to verify the reliability of the SAM over time through a two-week test-retest design as well as through the use of Cronbach's alpha.

CHAPTER 2

METHOD

Participants

We used the Georgia Southern University SONA system to recruit participants for this study. Participants consisted of both male and female students who were eighteen years old or older. Data from international students and recent immigrants were excluded from our analyses. Students enrolled in any psychology course were allowed to participate and received SONA credit for their participation.

Item Construction

In the item construction phase, we had 113 university students (32 male, 81 female). The average age of the students was 20 ($SD = 2.20$), with a range from 18-31. There were 44 first-year students (38.9%), 34 second-year students (30.1%), 10 third-year students (8.85%), and 25 fourth-year students (22.1%) who participated in this phase of the study. The ethnicities of the participants included Caucasian (59.3%), African American (25.7%), Hispanic (4.42%), and others (10.6%).

Factor Analysis

The factor analysis stage consisted of 286 participants (78 males, 207 females, and 1 other). Many ethnicities were represented, include Caucasian (55.9%), African American (32.2%), Hispanic (4.2%), Asian (1%), and other (6.6%). In relation to education level, there were 127 first-year students (44.4%), 76 second-year students (26.6%), 56 third-year students (19.6%), 24 fourth-year students (8.4%), and 3 students who were beyond their fourth year (1.0%). The age of the participants ranged from 18 to 44, with a mean age of 19.79 ($SD = 2.95$).

Validity and Internal Reliability

As demonstrated in Table 2.1 a total of 131 participants (24 males, 103 females, 4 others) were included in the validation of the SAM. The majority of our sample indicated that their ethnicity was

Caucasian (58.8%), however other ethnicities were represented, including African American (19.8%), Hispanic (6.9%), and Asian (1.5%), and other (13.0%). The majority of participants were first (29.0%)-, second- (29.8%), or third-year (24.4%) students. The age of participants ranged from 18 to 53, with a mean age of 21.31 ($SD = 5.14$).

Table 2.1: *Sociodemographic Characteristics and SAM Scores*

Variables		N	%	<i>p</i>
Gender	Male	24	18.3%	.231**
	Female	103	78.6%	
	Other	4	3.1%	
Race	Caucasian	77	58.8%	-.037
	African American	26	19.8%	
	Hispanic	9	6.9%	
	Asian	2	1.5%	
	Other	17	13%	
Education	1 st year	38	29.0%	-.198*
	2 nd year	39	29.8%	
	3 rd year	32	24.4%	
	4 th year	14	10.7%	
	Beyond 4 th year	8	6.1%	

Key: *: $p < .05$; **: $p < .01$

Test-Retest Reliability

To identify the reliability of the SAM, a two-week test-retest design was used. Forty-seven students (10 males, 37 females) completed the test-retest assessment (Table 2). Participants' ages ranged from 18 to 45, with an average age of 21.19 ($SD = 4.85$). The majority indicated their ethnicity to be Caucasian (76.6%), however other ethnicities were represented, including African Americans (12.8%),

Hispanics (4.3%), and others (6.4%). The majority of participants were first- (29.8%), second- (27.7%), or third-year (27.7%) students.

Table 2.2: *Sociodemographic Characteristics of the Test-Retest Reliability*

Variables		N	%
Gender	Male	10	21.3%
	Female	37	78.7%
Race	Caucasian	36	76.6%
	African American	6	12.8%
	Hispanic	2	4.3%
	Other	3	6.4%
Education	1 st year	14	29.8%
	2 nd year	13	27.7%
	3 rd year	13	27.7%
	4 th year	2	4.3%
	Beyond 4 th year	5	10.6%

SAM Item Construction

In the first phase of this study, participants answered the following prompt: “In your opinion, what might cellphone addiction look like? In other words, what kind of behaviors might you see if someone is addicted to cellphone use? What kind of thoughts might people have if they are addicted to their cellphone? What feelings might be associated with cellphone addiction?” The responses were compiled to create 97 items for the SAM. These items were reviewed for redundancy and subsequently reduced to a total of 75 items.

Factor Analysis

In the second phase, we completed exploratory factor analysis on the remaining 75 items. We began this phase by conducting a Qualtrics survey where students answered each of the items on the following scale: 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Often, 5 = Very Often, 6 = Always. In addition to the scale items, we asked participants to go into their phone settings, navigate to their screen-time option, and report how much time they spent on social networking, entertainment, productivity, and gaming over the past 7 days. We also included a seriousness check that stated, “It would be very helpful if you could tell us at this point whether you have focused on the survey items and taken the survey seriously. It helps us to know if you were just clicking through the items or carefully responding to the survey.” Participants could choose one of two answers, “I have taken part in the survey seriously” or “I have just clicked through, please throw my data away” (modified from Aust et al., 2013). A seriousness check measure has shown to improve the validity of data (Aust et al., 2013).

After data were collected, we removed all responses from participants who indicated that they did not take the study seriously then conducted an exploratory factor analysis with varimax rotation. SPSS identified separate factors with an Eigenvalue of 1.0. 18 factors received an Eigenvalue of 1.0 or above, but an examination of the scree plot indicated 4 unique factors before the slope flattened considerably. When we examined unique loadings above .50, four key constructs emerged. Closer examination of each item provided evidence for constructs aligning with addiction components (Griffiths, 1996): withdrawal, conflict, salience, and mood modification. The entire scale then consisted of 27 items, with 16 items representing the withdrawal construct, 4 items representing the conflict construct, 4 items representing salience, and 3 items representing mood modification.

In the third phase of this study the portion associated with the thesis, we assessed both validity and the reliability of the SAM. Details of this third phase are provided in the following sections.

Materials

Smartphone Addiction Measure (SAM). Items for the smartphone addiction scale were generated from the responses of 113 college students to a prompt asking for their opinion on what constitutes cellphone addiction. Students were asked what thoughts, behaviors, and feelings they believed accompany such an addiction. 27 items were created with responses rated on the following scale: 1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Often, 5 = Very Often, 6 = Always. None of the items were reverse scored. Please see Appendix A for the SAM.

Validity with Positive Correlations

Smartphone Addiction Scale (SAS; Kwon et al., 2013). To verify the construct validity of the SAM through a positive correlation with a similar scale, we used the 33-item Smartphone Addiction scale, with six subscales: daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse, and tolerance. Each item is answered on a Likert-type scale from strongly disagree (1) to strongly agree (6). None of the items are reversed scored. Each participant's scores were summed, with a higher score indicating more smartphone addiction. Please see Appendix B for the SAS.

Internet Addiction Test (IAT; Young, 1998). To establish construct validity using a positive correlation with a similar scale, we also used the internet addiction test. This is a 20-item scale that measures internet addiction on the following 5-point Likert-type scale: 0 = Not Applicable 1 = Rarely, 2 = Occasionally, 3 = Frequently, 4 = Often, 5 = Always. No items are reverse scored. Answers to each item are summed together with higher totals illustrating more internet addiction. Please see Appendix C for the IAT.

Short Urgency, Premeditation (lack of), Perseverance (lack of), Sensation Seeking, Positive Urgency, Impulsive Behavior Scale (SUPPS-P; Cyders et al., 2014). To establish construct validity using a positive correlation with a similarly related scale, we used the short version of the UPPS-P. This is a 20-item 4-point Likert-type scale that measures impulsivity and ranges from agree strongly (1) to disagree

strongly (4). The SUPPS-P has five subscales with four items on each: negative urgency, lack of perseverance, lack of premeditation, sensation seeking, and positive urgency. Items 3, 6, 8, 9, 10, 13, 14, 15, 16, 17, 18, and 20 are reversed score items. Scores for each item are averaged together within each subscale with higher scores indicating higher levels of impulsivity. Please see appendix D for the SUPPS-P.

Validity with Negative Correlations

Rotter's LOC Scale (LOC; Rotter, 1966). To assess construct validity using a negative correlation with a dissimilar scale, we used the LOC scale which measures the extent to which a person feels in control of life events. This is a 29-item forced-choice questionnaire with 6 filler questions (questions 1, 8, 14, 19, 24, and 27). Participants' scores are calculated by summing up the number of external choices: 2.a, 3.b, 4.b, 5.b, 6.a, 7.a, 9.a, 10.b, 11.b, 12.b, 13.b, 15.b, 16.a, 17.a, 18.a, 20.a, 21. a, 22.b, 23.a, 25.a, 26.b, 28.b, 29.a. A higher score indicates an external locus of control, and a lower score indicates an internal locus of control. Please see Appendix E for Rotter's Internal External Control Scale.

Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004). To establish construct validity with a negative correlation between the SAM and a dissimilar measure, we used the connectedness to nature scale. We expect that those who are experiencing smartphone addiction lack the ability to be connected with nature due to their incessant use of their smartphone. The CNS is a 14-item scale that measures the extent to which participants feel that they are a part of the natural world. Participants answer the items using a 5-point Likert-type scale from strongly disagree (1) to strongly agree (5). Items 4, 12, and 14 are reverse scored items. The score is the mean response on the items, with higher scores related with stronger feelings of connection to nature. Please see appendix F for the CNS.

The Big Five Inventory (BFI; John & Srivastava, 1999). To examine construct validity using a negative correlation with an unrelated scale, we also utilized the Big Five Inventory. This version of a Big-Five measure is a 44-item inventory that assesses individuals based on five factors of personality:

extraversion, agreeableness, conscientiousness, neuroticism, and openness. Participants answer each question using a 5-point Likert-type scale from disagree strongly (1) to agree strongly (5). The reverse scored items for this scale are items 2, 6, 8, 9, 12, 18, 21, 23, 24, 27, 31, 34, 35, 37, 41, and 43. Each question is associated with a subscale that pertains to one of the five personality factors. The items in each subscale were averaged, with a higher score indicating a higher level of each personality type. We focused on the conscientiousness portion of this inventory in our evaluation of construct validity because those who are experiencing smartphone addiction are expected to report lower self-discipline, organization efficiency, and deliberation. Please see Appendix G for the BFI.

Procedure

Participants signed up for this study through the university's SONA system. After signing up for the study, participants were directed to a Qualtrics survey where they were first asked to provide informed consent. After providing informed consent, they were asked to complete the aforementioned scales. The order of presentation of the scales were randomized for each participant. The participants were also asked to complete the entire questionnaire to the best of their ability. After a period of two weeks, participants were asked to complete a second survey that contained only the SAM so as to establish reliability through a test-retest design.

CHAPTER 3

RESULTS

Validity with Positive Correlations

To establish the validity of the SAM, bivariate correlations were conducted between each of the aforementioned scales (i.e., SAS, IAT, SUPPS-P, LOC, CNS, & BFI) and the subscales of the SAM. As shown in Table 3.1, there were significant ($p < .01$) positive correlations between the SAS and each of the SAM subscales. The data also revealed that there were significant ($p < .01$) positive correlations between the IAT and each SAM subscale.

In reference to the SUPPS-P, significant ($p < .01$) positive correlations were established between its negative urgency subscale and the SAM's withdrawal $r(126) = .268$, conflict $r(126) = .360$, and salience subscales $r(126) = .242$. However, no significant correlation was present between negative urgency and mood modification $r(128) = .117$. No significant correlations were present between the SAM's subscales and the SUPPS-P's lack of perseverance and lack of premeditation subscales. There was a significant ($p < .05$) positive correlation between positive urgency and conflict, $r(127) = .218$, but no other correlations were found between positive urgency and the other subscales. Lastly, sensation seeking only significantly correlated ($p < .01$) with conflict, $r(128) = -.193$.

Validity with Negative Correlations

In reference to the scales that were predicted to have a negative correlation with the SAM, the LOC and CNS were not found to have any significant correlations with the subscales of the SAM. The conscientiousness subscale of the BFI also did not correlate with the conflict or salience subscales. However, conscientiousness was found to have a significant ($p < .01$) negative correlation with withdrawal, $r(123) = -.306$, and mood modification, $r(125) = -.247$.

Table 3.1: *Construct Validity of the SAM*

Factor	SAS	IAT	Neg. U	Pers.	Premed	Pos. U	S.S.	LOC	CNS	Cons.
Withdrawal	.715**	.540**	.268**	.159	.062	.173	-.134	-.062	-.092	-.306**
Conflict	.696**	.603**	.360**	.091	.004	.218*	-.193**	.01	-.041	-.128
Salience	.610**	.458**	.242**	.077	.124	.107	-.165	.054	-.091	-.115
Mood Modification	.588**	.522**	.117	.081	.114	.110	-.209	-.058	-.103	-.247**

Note: *: $p < .05$; **: $p < .01$

Reliability

At time one, the Cronbach's alpha for the scale as a whole was .952. The Cronbach's alpha for the withdrawal, conflict, salience, and mood modification subscales at time two were .947, .751, .796, and .828, respectively. Indicating that there is internal consistency within the scale as a whole as well as within each subscale.

The test-retest reliability of the SAM was significant ($p < 0.01$) as evident by a Pearson's correlation of .808. The test-retest reliability for the withdrawal, conflict, salience, and mood modification subscales were .769, .760, .834, and .686, respectively, and were significant ($p < .01$), indicating that there is reliability across time in the scale as a whole as well as with each subscale.

CHAPTER 4

DISCUSSION

We created a smartphone addiction measure (SAM) that would be applicable to college students in the U.S. This measure was comprised of 27 items representing 4 subscales: salience, mood modification, withdrawal, and conflict. Interestingly, these subscales parallel four of the six faucets of a behavioral addiction suggested by Griffiths (1996). The six faucets include: salience, mood modification, withdrawal, conflict, tolerance, and relapse. According to Griffiths, salience means that the addictive behavior becomes the most important focus of the person's life, leading to its domination of thoughts, feelings, and behavior. Mood modification is the subjective experiences (e.g., feeling a buzz or high) caused by the addictive behavior and can be a coping mechanism. Withdrawal encompasses the unpleasant feelings or physical effects caused the removal or reduction of the addictive behavior. Conflict is characterized by the addictive behavior being the cause of conflicts both between the individual and others as well as within the individual. Tolerance is when the amount of time spent on the behavior continually increases to achieve former effects. Lastly, relapse is the tendency to readily return to the previously addictive behavior after the absence of it for many years.

With the exceptions of tolerance and relapse, the components of behavioral addiction as suggested by Griffiths (1996) are applicable to smartphone addiction. The salience component involves a smartphone becoming the most important focus in life and thus use of the smartphone dominates the thoughts, feelings, and behavior of the individual. Mood modification entails subjective experiences due to smartphone use, such as increased enjoyment as addressed in the SAM. The withdrawal component is characterized by unpleasant feelings, such as anxiety, worry, and irritability, that occur when one is without a smartphone or usage is restricted. Lastly, conflict consists of interpersonal conflict, such as being unable to interact with others, and intrapsychic conflict, such as impairments in daily functioning, due to smartphone use.

Validity with Positive Correlations

The presence of four established addiction components speaks to the validity of the SAM as a measure of addiction. We formally established the construct validity of the SAM through positive correlations with the SAS, the IAT, and each of the subscales in the SUPPS-P.

Theoretically, the SAS and IAT should be related to the SAM because they measure similar constructs; the SAS measures smartphone addiction, and the IAT measures internet addiction. As hypothesized, we found strong positive correlations between each of the SAMs subscales and the SAS and IAT, thus providing support for construct validity.

As a final series of construct-validity measures seeking positive correlations with the SAM, we used the SUPPS-P. Recall that this assessment contains 5 subscales: negative urgency, lack of perseverance, lack of premeditation, sensation seeking, and positive urgency. Because impulsivity has been considered a core feature of addiction (Kim et al., 2016), we believed that the different aspects of impulsivity, as provided by the SUPPS-P, would also positively correlate with the SAM and thus provide additional support for construct validity, however that was not the case with all of the subscales.

The negative urgency subscale of the SUPPS-P had a positive correlation with the salience, withdrawal, and conflict subscales of the SAM. Negative urgency reflects impulsive or rash actions as a consequence of negative affect (Whiteside & Lynam, 2001). The most likely reason that these three subscales were found to be positively associated with negative urgency is because they incorporate rash actions and negative affect. For example, one of the items on the salience subscale is “I check my phone for new notifications.” We can assume that a person with smartphone addiction would indicate either “very often” or “always” as their answer choice for this item, thus reflecting a rash or impulsive action. Another example would be the item on the withdrawal subscale that states: “I worry about what I would do if I could not use my phone.” Negative affect is covered by the worry aspect, and possible rash actions

could be indicated by “what would I do” without the smartphone. These two examples typify many SAM items that cover rash actions and negative affect that characterize negative urgency.

In contrast to the positive correlations found between negative urgency and the salience, withdrawal, and conflict subscales of the SAM, no correlation was found between negative urgency and the mood modification subscale of the SAM. The lack of correlation between negative urgency and mood modification may be due to the moods that make up this particular subscale of the SAM. Our mood modification subscale focuses on boredom and enjoyment, neither of which are negative emotions. The items on this subscale are not consistent with rash actions that encompass negative urgency, which may be the likely cause of the lack of correlation. For instance, one of our items is “I am bored when I am without my phone.” Items such as these do not capture rash action due to negative affect.

The positive urgency subscale of the SUPPS-P positively correlated with the conflict subscale of the SAM. In other words, our conflict subscale was related to impulses based on positive emotions as characterized by positive urgency (Whitehead & Lynam, 2001). The conflict subscale is distinguished by impulsive behaviors that can be explained by the satisfaction smartphone use provides, such as procrastination due to the satisfaction elicited by smartphone use, as demonstrated in the item “I procrastinate important events because of my phone. This would account for the relation between this subscale and positive urgency.

In contrast, the sensation seeking subscale of the SUPPS-P negatively correlated with the conflict subscale of the SAM. The sensation seeking subscale, is characterized by the urge to participate in exciting, new, or dangerous activities. We believed that we would find a positive correlation between the two subscales since the lack of participation in daily activities, as reflected in the conflict subscale, may be due to the exciting activities that participants would experience from using their smartphone. However, the conflict subscale incorporates not participating in activities due to smartphone use that did not result in experiencing new or exciting experiences, which is in opposition to seeking out the exciting

experiences as comprised in sensation seeking, thus accounting for the negative relationship between the two scales.

The correlations found between the subscales of both the SAM and the SUPPS-P suggests that there are certain aspects of impulsivity that have a relationship, whether positive or negative, with smartphone addiction, while others do not. For instance, the conflict subscale of the SAM showed significant correlations with three of the five SUPPS-P subscales, whereas the mood modification subscale was not correlated with any of them. Previous studies have found that there is a positive correlation between smartphone use and impulsivity, however it has been noted that such studies are scant and have been conducted in Asian countries, which calls into question the generalizability to western cultures (Peterka-Bonetta, 2019). It is important to point out that the generalizability of eastern cultures to a western culture was one of the reasons that we proposed the creation of the SAM. Therefore, it is possible that the differences between cultures may account for the lack of adequate correlations between the SAM and the SUPPS-P. Also, the previous study used the short form of the Barratt Impulsivity Scale 15 to measure impulsivity; a difference in the measurements used in each study may help account for the lack of consistent correlations (Peterka-Bonetta, 2019).

Validation with Negative Correlations

We believed that we would find a negative correlation between the SAM and the LOC, CNS, and the conscientiousness subscale of the BFI. However, a significant correlation was not found between the SAM subscales and the LOC. A possible explanation for this may be that, as indicated by previous research, both an internal and external locus of control can lead to increased phone use (Li et al., 2015). Those with an internal locus of control increase phone use because they believe that they can strategically use the device to their advantage, such as for data management or scheduling, which may allow them to better control their lives. In contrast, those with an external locus of control may use their phone often to reach out to others using calls, texting, and social media. Therefore, smartphone addiction and locus of

control may not be associated since both types of control can lead to the same amount of phone use but for different reasons.

We predicted that we would find a negative correlation between the SAM subscales and the connection with nature (i.e., the CNS); however, our results did not support our hypothesis. The research on the relationship between smartphone addiction and connectedness with nature is sparse. One study found that there is a negative correlation between connection with nature and problematic smartphone use, although the authors did not elaborate on what that connection entailed (Richardson, Hussain, & Griffiths, 2018). The CNS addresses one's affective, experiential connection to nature (Mayer & Frantz, 2004). We believed that a person with smartphone addiction would lack this affective connection because of their excessive use of, and connectedness to, smartphones. Focus on phones was expected to reduce interaction with the external world, including natural surroundings. However, given the many functions of a smartphone (e.g., a camera), it is possible that people use smartphones to enjoy nature, such as taking pictures while they experience nature (e.g., hiking or going to the beach) or watching videos about aspects of nature, which could influence an individual's thoughts, feelings, and behaviors toward smartphone use as addressed by the SAM.

Finally, we predicted a negative correlation between subscales of the SAM and the conscientiousness subscale of the BFI. In fact, we did find significant negative correlations between conscientiousness and the mood modification and withdrawal subscales of the SAM. Conscientiousness is comprised of the abilities to be self-controlled, hardworking, orderly, rule abiding, and responsible to others (Roberts et al., 2014a). Hence, it is readily apparent why conscientiousness is negatively correlated with withdrawal and mood modification. A person with smartphone addiction who is experiencing withdrawal or mood modification in accordance with the SAM would have thoughts, feelings, and behaviors determined by their use, or lack thereof, of a smartphone. Such negative experiences would correlate with a lack of self-control, responsibility to others, and orderliness as characterized by conscientiousness.

Additionally, we expected that conscientiousness would be negatively correlated with the salience and conflict subscales of the SAM. However, we did not find significant correlations between conscientiousness and these two subscales. One explanation would be that each of these subscales did not address all aspects of conscientiousness. The salience items do cover lack of self-control (e.g., checking notification) and the conflict items do address lack of hard work (e.g., impairment of daily life), but they are each only addressing one aspect of conscientiousness which may not have been sufficient to establish the correlation that we had predicted with an overall measure of conscientiousness.

Reliability

In addition to measures of potential validity, the reliability of the SAM was evaluated. First, we looked at the internal reliability of the scale through the use of Cronbach's alpha. Internal reliability, also known as internal consistency, is the extent to which all items in a scale measure the same concept (Tavakol & Dennick, 2011). An acceptable alpha typically lies within the range of 0.70 to 0.95. As a whole, the SAM had an alpha of .967, and the subscales had Cronbach's alphas ranging from 0.751 to 0.952. This means that each item in the SAM, as well as each of the subscales, converge well on a single construct. From these data we can see that the SAM shows strong internal consistency.

As a second measure of reliability, we used a two-week test-retest design to determine the reliability of the scale over time. Although a true standard does not exist, a test-retest coefficient of 0.80 or higher has been recommended for good reliability, and .70 has been deemed acceptable (Polit, 2014). For the SAM as a whole, and each of its subscales independently, the test-retest reliability can be deemed consistent across time. Thus, the SAM is a dependable measure that captures a consistent assessment of smartphone addiction. We can rely on the SAM to measure the same constructs across time.

Potential Limitations

The limitations of this study must be taken into account when interpreting these results. First, the sample was fairly small with only 133 participants, and of those, only 47 completed the retest portion of the study. It is suggested that at least 200 participants should be tested when initially assessing the validity and reliability of a psychometric measurement, such as the SAM (Frost et al., 2007).

Second, the gender ratio was highly disproportionate throughout all three phases of this research. There were 103 females (76%), which is more than four times the proportion of male participants (24, 17.8%). The authors of the SAS (Kwon et al. 2013a) also mentioned their gender ratio to be a limitation since there were twice as many women as men when they validated their scale, thus allowing for a possible gender difference error. The differences in smartphone use and, in turn, smartphone addiction between the genders must be evaluated to account for this possible error.

Lastly, we had the limitation of using a convenience sample. Convenience sampling occurs when researchers choose to use the sample most readily available to them (Etikan et al., 2016). Convenience sampling is more likely to be biased as well as highly susceptible to outliers. In our case, our sample only included students from one university because that was the easiest sample to obtain. This makes us more susceptible to possible bias due to various factors, including the location of the university, the predominant ethnicity of students, and acceptance standards (e.g., standardized test scores, grades in high schools, etc.). Additionally, there is a higher susceptibility to outliers, such as age, in convenience samples. In our study we had a 53-year-old participant that may be considered a possible outlier. Only 79% of U.S. adults in the age range of 50-64 own a smartphone in comparison to the 96% of young adults who own a smartphone (Pew Research Center, 2019). We also encounter the issue of there being much research on college students (e.g., Acharya et al., 2013, Carbonall et al., 2018, Lepp et al., 2015, Roberts et al., 2014b, etc.) and the elderly, those who are 60 or more years old (e.g., Hwangbo et al., 2016,

McGaughey et al., 2013), but little research focuses on middle adulthood. Therefore, we cannot control for a potential age-difference error.

Despite these limitations, this research has proposed a new diagnostic tool for the measurement of smartphone addiction among U.S. college students. Future research will need to further evaluate the construct validity of the SAM using other dissimilar measures than the ones presented here, since most of our hypothesized negative correlations were not supported. Another option would be changing the scale used for a particular factor of interest, such as a different scale to measure impulsivity, since there may be better measures (e.g., Barratt Impulsivity Scale 15) to assess this association. Additionally, it would be beneficial for future researchers to evaluate the generalizability of the SAM to other populations across the U.S. since item construction and validation of the scale all took place at only one university, which may lack the necessary diversity for the creation of a new behavioral measurement instrument.

CHAPTER 5

CONCLUSION

In conclusion, this study provided a new smartphone addiction measurement tool that may allow for a way to clinically diagnosis addiction among college students. The SAM does address four of the six behavioral addiction criteria suggested by Griffiths (1996). Behavioral addictions, besides gambling addiction, have been consistently overlooked by reputable sources, such as any version of the DSM. The lack of recognition of behavioral addictions, including smartphone addiction, hinders progress in establishing treatment regimens to alleviate addictive symptoms. Smartphone addiction is detrimental, especially in young adults, in so many aspects of life, including health (Acharya et al., 2013), academics (Bjorsen &Archer, 2015), and driving (Bradish et al., 2019).

Having a measurement to diagnosis smartphone addiction in the college population can be useful in various ways. The subscales of the SAM address four of the six suggested behavioral addiction criteria: withdrawal, conflict, salience, and mood modification. The association of these criteria to smartphone addiction gives us clearer insight into what components could be further evaluated. For instance, the SAM could be used to help evaluate the interpersonal interactions of those with smartphone addiction since the SAM addresses conflict. Further, the SAM addresses withdrawal, which lends support for using it to evaluate the unpleasant feelings, such as anxiety, worry, and irritability, that occur due to the reduction of or inability to use a smartphone.

Beyond applications of the SAM based on its subscales, it could also be used in a broader research setting to evaluate possible relationships between smartphone addiction and other observed behaviors or consequences, such as car accidents, reduced work ethic, and the degeneration of academic accomplishments. Additionally, the SAM could be used in a clinical setting to help diagnosis students and create treatment regimens to lessen or remove the addictive behaviors, thus allowing for possible improvements in their quality of life and daily functioning. This measurement provides a specific

evaluation of an at-risk population: U.S. college students – a population of young adults who would benefit from intervention.

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APPENDIX A

SMARTPHONE ADDICTION MEASURE

No.	Question	M(SD)	Factor			
			Salience	Mood Modification	Withdrawal	Conflict
1	I enjoy using my phone.	4.76(1.09)		.542		
2	I feel anxious when I do not have my phone.	2.89(1.42)			.756	
3	I feel anxious if my phone is taken away.	3.14(1.57)			.718	
4	I feel anxious if my phone is not in the same room as me.	2.54(1.25)			.730	
5	I feel inadequate when I am without my phone.	2.40(1.34)			.687	
6	I feel comforted when I have my phone.	3.71(1.46)			.593	
7	I am bored when I am without my phone.	3.39(1.32)		.628		
8	I feel lost when I do not have my phone.	2.74(1.43)			.695	
9	I fear my phone battery dying.	2.80(1.41)		.659		
10	I feel I cannot live without my phone.	2.79(1.53)			.508	
11	I think about checking notifications on my phone.	3.67(1.28)	.600			
12	I check my phone for new notifications.	4.20(1.21)	.561			
13	I am unable to be separated from my phone.	2.22(1.27)			.670	
14	I feel insecure when I am without my phone.	2.25(1.27)			.678	
15	I think about the battery life on my phone.	3.19(1.40)	.682			
16	My phone use impairs my daily life (e.g., work and school).	2.62(1.38)				.676
17	I procrastinate important events because of my phone.	3.09(1.45)				.668

18	I am unable to interact with others while using my phone.	2.07(1.07)		.645
19	I feel irritable when I do not have my phone.	2.39(1.27)	.619	
20	I feel a loss of power when I do not have my phone.	2.38(1.34)	.636	
21	I worry about what I would do if I could not use my phone.	2.42(1.28)	.520	
22	I do not accomplish what I should when I am at work, school, or home because of my phone.	2.61(1.27)		.761
23	I would panic if I did not have my phone.	4.49(2.06)	.637	
24	I would feel anxious if I was without my phone.	4.56(1.94)	.758	
25	I would be afraid that I am missing out if I was without my phone.	4.31(1.88)	.505	
26	I would be bored if I did not have my phone.	5.38(1.68)	.731	
27	I would feel anxious if my phone was not in the same room as me.	4.31(1.89)	.666	

APPENDIX B

SMARTPHONE ADDICTION SCALE

Instructions: Indicate the degree to which you agree with the following using this scale: 1 = strongly disagree, 2 = disagree, 3 = weakly disagree, 4 = weakly agree, 5 = agree, 6 = strongly agree.

1. Missing planned work due to smartphone use
2. Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use
3. Experiencing lightheadedness or blurred vision due to excessive smartphone use
4. Feeling pain in the wrists or at the back of the neck while using a smartphone
5. Feeling tired and lacking adequate sleep due to excessive smartphone use
6. Feeling calm or cozy while using a smartphone
7. Feeling pleasant or excited while using a smartphone
8. Feeling confident while using a smartphone
9. Being able to get rid of stress with a smartphone
10. There is nothing more fun to do than using my smartphone.
11. My life would be empty without my smartphone.
12. Feeling most liberal while using a smartphone
13. Using a smartphone is the most fun thing to do.
14. Won't be able to stand not having a smartphone
15. Feeling impatient and fretful when I am not holding my smartphone
16. Having my smartphone in my mind even when I'm not using it
17. I will never give up using my smartphone even when my daily life is already greatly affected by it.
18. Getting irritated when bothered while using my smartphone
19. Bringing my smartphone to the toilet even when I am in a hurry to get there
20. Feeling great meeting more people via smartphone use

21. Feeling that my relationships with my smartphone buddies are more intimate than my relationships with my real-life friends
22. Not being able to use my smartphone would be as painful as losing a friend.
23. Feeling that my smartphone buddies understand me better than my real-life friends
24. Constantly checking my smartphone so as not to miss conversations between other people on Twitter or Facebook
25. Checking SNS (Social Networking Service) sites like Twitter or Facebook right after waking up
26. Preferring to talk with my smartphone buddies to hanging out with my real-life friends or with the other members of my family
27. Preferring searching from my smartphone to asking other people
28. My fully charged battery does not last for one whole day.
29. Using my smartphone longer than I had intended
30. Feeling the urge to use my smartphone again right after I stopped using it
31. Having tried time and again to shorten my smartphone use time but failing all the time
32. Always thinking that I should shorten my smartphone use time
33. The people around me tell me that I use my smartphone too much.

APPENDIX C

INTERNET ADDICTION TEST

Instructions: This questionnaire consists of 20 statements. After reading each statement carefully, based upon the 5-point Likert scale, please select the response (0, 1, 2, 3, 4 or 5) which best describes you. If two choices seem to apply equally well, circle the choice that best represents how you are most of the time during the past month. Be sure to read all the statements carefully before making your choice. The statements refer to offline situations or actions unless otherwise specified. 0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always

1. Do you feel that you stay online longer than you intend?
2. Do you neglect household chores to spend more time online?
3. Do you prefer the excitement of the Internet to intimacy with your partner?
4. Do you form new relationships with fellow online users?
5. Do others in your life complain to you about the amount of time you spend online?
6. Does your work suffer because of the amount of time you spend online?
7. Do you check your email before something else that you need to do?
8. Does your job performance or productivity suffer because of the Internet?
9. Do you become defensive or secretive when someone asks what you do online?
10. Do you block disturbing thoughts about your life with soothing thoughts of the Internet?
11. Do you find yourself anticipating when you go online again?
12. Do you feel that life without the Internet would be boring, empty, and joyless?
13. Do you snap, yell, or act annoyed if someone bothers you while you are online?
14. Do you lose sleep due to late night log-ins?
15. Do you feel preoccupied with the Internet when offline or fantasize about being online?
16. Do you find yourself saying “just a few more minutes” when online?
17. Do you try to cut down the amount of time you spend online and fail?

18. Do you try to hide how long you've been online?
19. Do you choose to spend more time online over going out with others?
20. Do you feel depressed, moody, or nervous when you are offline, which goes away once you are back online?

APPENDIX D

URGENCY, PREMEDITATION (LACK OF), PERSEVERANCE (LACK OF), SENSATION
SEEKING, POSITIVE URGENCY, IMPULSIVE BEHAVIOR SCALE—SHORT VERSION (SUPPS-
P)

Instructions: Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement. If you Agree Strongly circle 1, if you Agree Somewhat circle 2, if you Disagree somewhat circle 3, and if you Disagree Strongly circle 4. Be sure to indicate your agreement or disagreement for every statement below.

1. I generally like to see things through to the end.
2. My thinking is usually careful and purposeful.
3. When I am in great mood, I tend to get into situations that could cause me problems.
4. Unfinished tasks really bother me.
5. I like to stop and think things over before I do them.
6. When I feel bad, I will often do things I later regret in order to make myself feel better now.
7. Once I get going on something I hate to stop.
8. Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.
9. I quite enjoy taking risks.
10. I tend to lose control when I am in a great mood.
11. I finish what I start.
12. I tend to value and follow a rational, "sensible" approach to things.
13. When I am upset I often act without thinking.
14. I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.
15. When I feel rejected, I will often say things that I later regret.

16. I would like to learn to fly an airplane.
17. Others are shocked or worried about the things I do when I am feeling very excited.
18. I would enjoy the sensation of skiing very fast down a high mountain slope.
19. I usually think carefully before doing anything.
20. I tend to act without thinking when I am really excited.

APPENDIX E

ROTTER'S LOC SCALE

Instructions: This is a questionnaire to find out the way in which certain important events in our society affect different people. Each item consists of a pair of alternatives lettered a or b. Please select the one statement of each pair (and only one) which you more strongly believe to be the case as far as you're concerned. Be sure to select the one you actually believe to be more true rather than the one you think you should choose or the one you would like to be true. This is a measure of personal belief: obviously there are no right or wrong answers.

- 1 a. Children get into trouble because their parents punish them too much.
b. The trouble with most children nowadays is that their parents are too easy with them.
- 2 a. Many of the unhappy things in people's lives are partly due to bad luck.
b. People's misfortunes result from the mistakes they make.
3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
b. There will always be wars, no matter how hard people try to prevent them.
- 4 a. In the long run people get the respect they deserve in this world.
b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
- 5 a. The idea that teachers are unfair to students is nonsense.
b. Most students don't realize the extent to which their grades are influenced by accidental happenings.
- 6 a. Without the right breaks one cannot be an effective leader.
b. Capable people who fail to become leaders have not taken advantage of their opportunities.
- 7 a. No matter how hard you try some people just don't like you.
b. People who can't get others to like them don't understand how to get along with others.
- 8 a. Heredity plays the major role in determining one's personality.
b. It is one's experiences in life which determine what they're like.
- 9 a. I have often found that what is going to happen will happen.

- b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.
- 10 a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
- b. Many times exam questions tend to be so unrelated to course work that studying is really useless.
- 11 a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
- b. Getting a good job depends mainly on being in the right place at the right time.
- 12 a. The average citizen can have an influence in government decisions.
- b. This world is run by the few people in power, and there is not much the little guy can do about it.
- 13 a. When I make plans, I am almost certain that I can make them work.
- b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
- 14 a. There are certain people who are just no good.
- b. There is some good in everybody.
- 15 a. In my case getting what I want has little or nothing to do with luck.
- b. Many times we might just as well decide what to do by flipping a coin.
- 16 a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
- b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.
- 17 a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
- b. By taking an active part in political and social affairs the people can control world events.
- 18 a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
- b. There really is no such thing as "luck."
- 19 a. One should always be willing to admit mistakes.
- b. It is usually best to cover up one's mistakes.
- 20 a. It is hard to know whether or not a person really likes you.
- b. How many friends you have depends upon how nice a person you are.

- 21 a. In the long run the bad things that happen to us are balanced by the good ones.
- b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.
- 22 a. With enough effort we can wipe out political corruption.
- b. It is difficult for people to have much control over the things politicians do in office.
- 23 a. Sometimes I can't understand how teachers arrive at the grades they give.
- b. There is a direct connection between how hard I study and the grades I get.
- 24 a. A good leader expects people to decide for themselves what they should do.
- b. A good leader makes it clear to everybody what their jobs are.
- 25 a. Many times I feel that I have little influence over the things that happen to me.
- b. It is impossible for me to believe that chance or luck plays an important role in my life.
- 26 a. People are lonely because they don't try to be friendly.
- b. There's not much use in trying too hard to please people, if they like you, they like you.
- 27 a. There is too much emphasis on athletics in high school.
- b. Team sports are an excellent way to build character.
- 28 a. What happens to me is my own doing.
- b. Sometimes I feel that I don't have enough control over the direction my life is taking.
- 29 a. Most of the time I can't understand why politicians behave the way they do.
- b. In the long run the people are responsible for bad government on a national as well as on a local level.

APPENDIX F

CONNECTEDNESS TO NATURE SCALE (CNS)

Instructions: Please answer each of these questions in terms of the way you generally feel. There are no right or wrong answers. Using the following scale, in the space provided next to each question simply state as honestly and candidly as you can what you are presently experiencing. 1 = Strongly Disagree, 2, 3 = Neutral, 4, 5 = Strongly Agree.

1. I often feel a sense of oneness with the natural world around me.
2. I think of the natural world as a community to which I belong.
3. I recognize and appreciate the intelligence of other living organisms.
4. I often feel disconnected from nature.
5. When I think of my life, I imagine myself to be part of a larger cyclical process of living.
6. I often feel a kinship with animals and plants.
7. I feel as though I belong to the Earth as equally as it belongs to me.
8. I have a deep understanding of how my actions affect the natural world.
9. I often feel part of the web of life.
10. I feel that all inhabitants of Earth, human, and nonhuman, share a common 'life force'.
11. Like a tree can be part of a forest, I feel embedded within the broader natural world.
12. When I think of my place on Earth, I consider myself to be a top member of a hierarchy that exists in nature.
13. I often feel like I am only a small part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees.
14. My personal welfare is independent of the welfare of the natural world.

APPENDIX G

THE BIG FIVE INVENTORY

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement. 1 = Disagree Strongly 2 = Disagree a little 3 = Neither agree nor disagree 4 = Agree a little 5 = Agree Strongly.

1. Is talkative
2. Tends to find fault with others
3. Does a thorough job
4. Is depressed, blue
5. Is original, comes up with new ideas
6. Is reserved
7. Is helpful and unselfish with others
8. Can be somewhat careless
9. Is relaxed, handles stress well
10. Is curious about many different things
11. Is full of energy
12. Starts quarrels with others
13. Is a reliable worker
14. Can be tense
15. Is ingenious, a deep thinker
16. Generates a lot of enthusiasm
17. Has a forgiving nature
18. Tends to be disorganized
19. Worries a lot

20. Has an active imagination
21. Tends to be quiet
22. Is generally trusting
23. Tends to be lazy
24. Is emotionally stable, not easily upset
25. Is inventive
26. Has an assertive personality
27. Can be cold and aloof
28. Perseveres until the task is finished
29. Can be moody
30. Values artistic, aesthetic experiences
31. Is sometimes shy, inhibited
32. Is considerate and kind to almost everyone
33. Does things efficiently
34. Remains calm in tense situations
35. Prefers work that is routine
36. Is outgoing, sociable
37. Is sometimes rude to others
38. Makes plans and follows through with them
39. Gets nervous easily
40. Likes to reflect, play with ideas
41. Has few artistic interests
42. Likes to cooperate with others
43. Is easily distracted
44. Is sophisticated in art, music, or literature