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The Influence of Cultural Attitudes and Norms on
Smartphone Use, Technostress, and Life Satisfaction

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The University of Tennessee, Knoxville

Abstract

Smartphones have greatly expanded since the turn of the century and have penetrated all aspects of people's lives, both positively and negatively. This study investigates the negative aspects of smartphone use and examines the link between culture – collectivistic personal attitudes and descriptive norms, compulsive usage of smartphones, stress derived from unhealthy technological use, and satisfaction with life. I conducted an empirical study consisting of 214 students enrolled at the University of Tennessee, Knoxville. Participants completed self-report measures of collectivistic attitudes and descriptive norms (Singelis, 1994; Triandis & Gelfand, 1998) and Satisfaction with Life (Diener, Emmons, Larsen, & Griffin, 1985) as well as compulsive usage of smartphones, technostress, and psychological traits (Lee, Chang, Lin, & Cheng, 2014) online, via Qualtrics Survey Software. Correlation analyses and a mediation analysis were conducted using the Statistical Package for Social Sciences (SPSS, version 22.0), which found that compulsive usage of smartphones marginally mediated the relationship between collectivistic attitudes/descriptive norms and technostress, with collectivistic attitudes and norms marginally correlating to compulsive usage and compulsive usage significantly correlating to technostress. The results indicated no significant negative correlation between technostress and satisfaction with life. This study assists in the development of awareness and adds to the limited literature regarding the negative aspects of modern communication technology, which has implications for academia, practitioners, government and non-profit organizations regarding the effects of smartphones on individual's and public health.

Keyword: compulsive usage of smartphones, technostress, satisfaction with life, collectivism, descriptive norms

The Influence of Cultural Attitudes and Norms on
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The turn of the century marked the beginning of the smartphone revolution. Since then, it has greatly expanded and has now penetrated all aspects of people's lives. As of December 2014, 75% of U.S. mobile users operated smartphones, compared to 27% in December 2010 (ComScore, 2015, p. 8). Furthermore, digital activity – Internet, social media, etc. – has increasingly shifted to mobile devices. Searches conducted via app and mobile browser increased 17% from the previous year while desktop searches declined (ComScore, 2015, p. 16). Smartphone use has rapidly increased worldwide, averaging 44.6% in 47 countries as of 2013 (Lee, Chang, Lin, & Cheng, 2014, p. 373). Today's smartphones provide extensive functionalities; it allows users, anywhere at any time, to “call, text, e-mail, video conference, micro-blog, interact on social-networks, surf the Internet, watch and share videos and pictures, play video games, and utilize a tremendous array of software driven applications” (Lepp, Barkley, & Karpinski, 2014, p. 343). Smartphones have contributed positive effects: increasing communication, improving efficiency, decreasing perceived loneliness, strengthening family bonds, establishing and maintaining friendships, and creating feelings of mutual support (Kennen, 2014, p. 4, 23; Ishii, 2006, p. 347).

However, scholars and popular media have questioned the implications of modern smartphones, indicating several negative and potentially devastating consequences from their use. In *Time*'s September 2014 issue “Never Offline,” Lev Grossman and Matt Vella wrote the following:

When technologies get adopted as fast as we tend to adopt Apple's products, there are always unintended consequences. When the iPhone came out it was praised as a design

and engineering marvel...but no one understood what it would be like to have it in our lives. Nobody anticipated the way [smartphones] exert a constant gravitational tug on our attention. *Do I have email? What's happening on Twitter? Could I get away with playing Tiny Wings at this meeting?* When you're carrying a smartphone, your attention is never entirely undivided...The reality of living with [a smartphone] is that it makes reality feel just that little bit less real. One gets overconnected...One forgets how to be alone and undistracted. (p. 44)

Scholars have empirically studied this “gravitational tug on our attention” in recent years.

Oulasvirta, Rattenbury, Ma, & Raita (2012) identified it as a checking habit – “brief, repetitive inspection of dynamic content quickly accessible on the device.” These automated behaviors “emerge and are reinforced by informational ‘rewards’ that are very quickly accessible” (p. 105). Tarafdar, Gupta, & Turel (2013) reported that 43% of smartphone users found their devices to be stressful because they felt a constant pressure to check for messages and e-mails to make sure that nothing important was missed. This is in spite of the fact that 60% of users checked their smartphones at least every hour; 54% checked their devices first thing in the morning, before going to sleep, and in the middle of the night; and 24% of users checked their smartphones while driving. This 24% is tragic when considering that an estimated “1.6 million, roughly 28%, of vehicle accidents a year are related to...compulsive mobile phone use while driving” (p. 269-270).

Oulasvirta, Rattenbury, Ma, & Raita (2012) noted that compulsive usage of smartphones is triggered by external cues or internal states. For example, users may check smartphones to “avoid boredom and cope with a lack of stimuli.” Feelings of obligation and a “desire to ‘stay on

top” can also trigger compulsive usage (p. 107). Lepp, Barkley, & Karpinski (2014) found a trend among high frequency smartphone users, exemplified by the following participant quote:

Sometimes the [smartphone] just makes me feel like it is a whole new world of obligations that I have because anybody can get a hold of me at any time by just thinking about me. You know, if my mom wanted to give me a call...she could. And if I did not call her back by the end of the day, she would get worried. It creates a bit of anxiety and it is kind of annoying sometimes. (p. 343-344)

Kennen (2014) expounds upon this trend. As technology advances, “there appears to be social expectations tied to these newer forms of communication.” For example, Ishii (2006) found that 58% of those who use mobile phones “for business purposes endorse that they feel as though their freedom is restricted by being constantly reachable...[and] availability expectations” (p. 348; Kennen, 2014, p. 25). Due to the ubiquitous nature of smartphones, people expect others to return texts, calls, or e-mails in a timely manner. Some may experience anxiety from “the pressure...of not wanting to make [others] feel as though they have indifferent feelings towards them by not responding quickly enough” (p. 30). Janoff-Bulman & Leggatt (2002) noted that individuals may feel bound by obligations since individuals “engage in these helping behaviors in spite of considerable personal inconvenience or hardship, largely because [people] believe [they] should” (p. 260).

In contrast to checking habit, Salehan & Negahban (2013) categorized habitual use as an addiction – an “oddly high dependence on a particular thing...characterized by repetitive acts...[to fulfill] the need for short-term satisfaction...which overshadows the long-term implications of his/her actions,” such as a “diminished sense of volitional control and induced persistent activity” (p. 2633; Lee, Chang, Lin, & Cheng, 2014, p. 373). Mobile phone addiction

is best explained by ritualistic motives (habit, passing time, etc.) and “can be characterized by symptoms like feeling uncomfortable and irritated when mobile phone is not accessible” (Salehan & Negahban, 2013, p. 2633; Lepp, Barkley, & Karpinski, 2014, p. 343). It has been associated with “high depression, social extroversion, anxiety, insomnia, and psychological distress” as well as “time management problems and academic problems in school” (Salehan & Negahban, 2013, p. 2633). Hong, Chiu, & Hong (2012) found that cell phone addiction mediated the relationship between high frequency users and anxiety. Oulasvirta, Rattenbury, Ma, & Raita (2012) noted that “sociologists have reported Westerners’ time-use becoming more irregular, fragmented, overlapped, and shifting to new places” (p. 105). Lee, Chang, Lin, & Cheng (2014) noted that “electromagnetic radiation of smartphones may affect biological systems by changing the antioxidant defense system of human tissues, leading to oxidative stress” (p. 373). This relates to compulsive usage of smartphones because mobile phone addiction has been “found to be a significant predictor of intention to use and purchase smartphones” (Salehan & Negahban, 2013, p. 2633). Considering these past findings, whether it is conceptualized as habitual, addictive, or compulsive, it is conceivable that problematic smartphone usage would elevate both psychological and physical stress for the user.

Compulsive usage of smartphones is considered a form of technostress – “a modern disease of adaptation caused by the inability to cope with the new computer technologies in a healthy manner” (Lee, Chang, Lin, & Cheng, 2014, p. 373; Salehan & Negahban, 2013, p. 2632). Tarafdar, Gupta, & Turel (2013) conceptualize technostress as the “misuse, overuse, overload, and stress brought on by [technology]” (p. 270). Within an organizational context, technostress has been correlated with “decreased job satisfaction, commitment and productivity, as well as increased work overload and work-home conflict” (p. 270). Lee, Chang, Lin, & Cheng (2014)

found that overdependence on smartphones resulted in compulsive usage, which enhanced user technostress (p. 374). They also found that the boom in smartphone technology enhanced the severity of technostress, causing even greater stress for users (p. 373). Charles, Piazza, Mogle, Sliwinski, and Alemida (2013) found that daily exposure to stress negatively related to psychological well-being. Since smartphones have become a pervasive and almost necessary device in many people's lives, I suspect that technostress, as a result of compulsive smartphones use, will increase daily stress and reduce well-being, ultimately resulting in the reduction of an individual's satisfaction with life. Satisfaction with life has been found to be "predictive of various life outcomes including physical and mental health, longevity, marital satisfaction, stronger social relationships, reduced risk of suicide, and alcohol and chemical abuse" (Lepp, Barkley, & Karpinski, 2014, p. 345). Thus, it is critical to examine whether and how compulsive usage and technostress affect subjective well-being.

Campbell (2007) found "distinctive cultural characteristics that influence the adoption and use of growing technology" (p. 344). Katz & Aakhus (2002) found that both social and technological factors affect the adoption, use, and conceptualization of mobile phones, the most critical factors for this study being attitudes and norms. For example, Salehan & Negahban (2013) noted one social issue tied to culture and modern technology – the intrusion of mobile phone use in public places (p. 2632). Campbell (2007) stated, "Users who speak on their mobile phones in public often do so at the expense of others...Some are curious about what is being said...while others have voiced complaints about being forced into eavesdropping. This problem stems from the conflicting nature of private and public space, resulting in ambiguous norms for mobile phone use in public" (p. 349). Campbell (2007) found that Japanese individuals "reported significantly lower tolerance for mobile phone use in public than those from Hawaii and

Sweden” (p. 356). Although Campbell (2007) explains this with population density, I suspect that it also stems from cultural norms and values. Since collectivist culture emphasize concern for others and a greater desire to maintain group harmony, lower tolerance can be explained by collectivist groups’ desires to avoid intrusive behavior.

Culture has also been shown to vary in degrees of social obligation. Janoff-Bulman & Leggatt (2002) studied the extent to which [Latinos and Anglos] desired and felt obligated to help others across a variety of social situations. Latinos – representing a collectivist culture – and Anglos – representing an individualistic culture – both “reported a strong sense of obligation with regard to close friends and family members.” Latinos, compared to Anglos, also reported a stronger sense of obligation to help more distant family and friends, “suggesting a more congruent view of personal autonomy and societal control in collectivist cultures than in individualist cultures” (p. 260). Combining collectivist cultures – that “emphasize positive group interrelationships, attending to others’ needs, and conformity – and the anytime-anywhere nature of smartphones, it is conceivable that collectivist cultures would place more emphasis, and thus greater expectation, on individuals to respond to texts, calls, e-mails, or comments on social media in a timely manner. For example, Caporael & Xie (2003) found that it was acceptable for employers to call Chinese participants during non-work hours, but unacceptable to American participants.

In Lee, Chang, Lin, & Cheng’s model, they found that certain psychological traits – external locus of control, need for touch, social interaction anxiety, and materialism – predicted for compulsive usage of smartphones, which positively correlated with technostress. Using the same model, this article investigates whether and how culture, rather than psychological traits, influences compulsive smartphone usage, technostress, and satisfaction with life. Specifically,

this study examines the influence of both personal attitudes and descriptive norms – “cognitions about typical beliefs, values, and behaviors of one’s [social] group,” which has been shown to significantly shape “people’s cognitive and behavioral reactions” (Shteynberg, Gelfand, & Kim, 2009, p. 47). Although there has been extensive research on the negative effects of various technologies on mental health, to my knowledge, no research has explored the influence of culture – personal attitudes and descriptive norms – on compulsive smartphone usage, technostress, and subjective well-being as measured by the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985).

Based on previous research, I propose the following hypotheses. Hypothesis one (H1) predicts that collectivistic attitudes and norms will positively correlate to compulsive usage of smartphones, so that smartphone users who report greater collectivist attitudes and norms will demonstrate more compulsive usage of smartphones. Hypothesis two (H2) predicts that compulsive usage of smartphones will positively correlate to technostress, so that those who experience higher compulsive usage will experience greater technostress. Combining these two hypotheses, hypothesis three (H3) predicts that compulsive usage of smartphones will mediate the relationship between collectivistic attitudes/descriptive norms and technostress. Lastly, Hypothesis four (H4) predicts that technostress will negatively correlate to satisfaction with life, such that those who experience greater technostress will experience decreased satisfaction with life. I empirically tested the proposed hypotheses by collecting primary data from smartphone users. Correlation analyses and a mediation analysis were conducted using the Statistical Package for Social Sciences (SPSS, version 22.0) and are interpreted in the discussion. This study is intended to add to the limited literature on the negative effects of smartphone usage. It

has implications for academia, mental health practitioners, government and non-profit organizations regarding the effects of smartphones on individual's and public health.

Method

Participants

A total of 229 university students volunteered to participate in this study. Fifteen individuals did not finish the online survey and were omitted from the final analysis, yielding a total of 214 participants (96 men and 118 women). Excluding two individuals who did not report their age, participant age ranged between 18 and 43 (mean age = 19.2 years), the majority of which were 18-20. In order to participate in the study, individuals had to be 18 or older and had to be enrolled at the University of Tennessee. In accordance with the "Ethical principles of Psychologists and Code of Conduct," I obtained approval from the University of Tennessee's Institutional Review Board, required all participants to complete Informed Consent forms, specified that participants could withdraw from the study at any time without penalty, and ensured anonymous survey responses (American Psychological Association, 1992). Participants were assigned unique ID codes and automatically received credit for Introductory Psychology or extra credit for upper-division Psychology courses upon completion.

Design and Procedure

A correlational design using self-report measures was used to collect primary data from smartphone users currently enrolled at UT during the spring semester, 2015. For H1, I measured collectivist attitudes/descriptive norms and compulsive usage of smartphones. For H2, I measured compulsive usage of smartphones and technostress. For H3, collectivist attitudes/descriptive norms was the independent/predictor variable, technostress was the dependent/criterion variable, and compulsive usage of smartphones was a mediating variable.

For H4, I measured technostress and satisfaction with life. Data was collected online using Qualtrics Survey Software.

To receive course/extra credit, participants enrolled in Introductory Psychology or upper-division Psychology courses are required to participate in research or complete alternative assignments created by their instructors. Individuals interested in participating in research were instructed to visit Sona Systems, the Department of Psychology's online participant pool, where they were required to create an account and select from a list of studies. Students who selected this study were directed to the Qualtrics survey and presented with the informed consent form. Consenting participants then completed 11 self-report measures that were randomly presented on their personal computer monitors. Lastly, participants answered demographic questions and were presented with a debriefing page that provided participants with the purpose of the study and thanked them for their participation.

Measures

Measures from Shteynberg, Gelfand, & Kim (2009). This study included two personal attitudes scales and two descriptive norms scales that were drawn from Shteynberg, Gelfand, & Kim (2009). The scales for collectivistic personal attitudes used Singelis's (1994) interdependent self construal scale and Triandis & Gelfand's (1998) personal attitude scale. The scale for collectivistic descriptive norms was developed by "[replacing] the personal referent of [Singelis's] attitude items with that of [one's social group]" (Shteynberg, Gelfand, & Kim, 2009, p. 50). The other scale for collectivistic descriptive norms used Triandis & Gelfand's descriptive norms counterpart. Both descriptive norms scales asked participants to answer the following for each item: "How frequently do your family/close friends do this?" The collectivistic attitudes measure based on Singelis's (1994) scale is a 15-item self-report questionnaire measured on a 7-

point scale from 1 (strongly disagree) to 7 (strongly agree). An example item is: “Even when I strongly disagree with group members, I avoid an argument.” The collectivistic norms measure based on Singelis’s (1994) scale is a 15-item self-report questionnaire measured on a 5-point scale from 1 (very rarely) to 5 (very often). An example item is: “Maintain harmony within one’s group.” The collectivistic attitudes measure based on Triandis & Gelfand’s (1998) scale is a 12-item self-report questionnaire measured on a 5-point scale from 1 (not at all important) to 5 (very important). An example item is: “To help a relative (within your means), if the relative has financial problems.” The collectivistic norms measure based on Triandis & Gelfand’s (1998) scale is a 12-item self-report questionnaire measured on a 5-point scale from 1 (very rarely) to 5 (very often). An example item is: “Sacrifice self-interest for the benefit of group/collective.” The Cronbach alpha coefficients were adequate for Singelis’s collectivistic attitudes scale ($\alpha = .77$), Singelis’s collectivistic norms scale ($\alpha = .77$), Triandis & Gelfand’s collectivistic attitudes scale ($\alpha = .84$), and Triandis & Gelfand’s collectivistic norms scale ($\alpha = .82$). Mean scores were calculated for each scale to be correlated with other variables in the final analysis. For the two personal attitudes instruments and the two descriptive norms instruments, high mean scores indicated greater collectivistic personal attitudes and greater collectivistic descriptive norms, respectively; low scores for all four instruments indicated lesser collectivistic personal attitudes and lesser collectivistic descriptive norms, respectively, and indicated greater individualistic attitudes and norms.

Measures from Lee, Chang, Lin, & Cheng (2014). This study included scales for compulsive usage of smartphones, technostress, and psychological traits – locus of control, materialism, need for touch, and social interaction anxiety – that were drawn from Lee, Chang, Lin, & Cheng (2014). Since this study adopted the same model proposed by Lee, Chang, Lin, &

Cheng – which analyzed psychological traits rather than cultural variables – I included the same scales for psychological traits used in their study. The measure for compulsive usage of smartphones is a 13-item self-report questionnaire measured on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). An example item is: “The first thing I do each morning is to check my mobile phone for missed calls or messages.” The measure for technostress is a 6-item self-report questionnaire measured on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). An example item is: “I am forced by my mobile phone to live with very tight time schedules.” Locus of control was measured using a 6-item self-report questionnaire on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). An example item is: “To a great extent, my life is controlled by accidental happenings.” Materialism was measured using a 6-item self-report questionnaire on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). An example item is: “I admire people who own expensive homes, cars, and clothes.” Need for touch was measured using a 6-item self-report questionnaire on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). An example item is: “When walking through stores, I can’t help touching all kinds of products.” Social interaction anxiety was measured using a 8-item self-report questionnaire on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). An example item is: “I often feel nervous even in casual get-togethers.” The Cronbach alpha coefficients were adequate for compulsive usage of smartphones ($\alpha = .87$), technostress ($\alpha = .85$), locus of control ($\alpha = .84$), materialism ($\alpha = .82$), need for touch ($\alpha = .82$), and social interaction anxiety ($\alpha = .82$). Mean scores were calculated for each scale to be correlated with other variables in the final analysis. High mean scores for all instruments indicated greater compulsive usage of smartphones, greater technostress, greater external locus of control, greater materialism, greater need for touch, and greater social interaction anxiety, respectively.

Measures from Diener, Emmons, Larsen, & Griffin (1985). To evaluate how cultural variables, compulsive usage of smartphones, and technostress influence subjective well-being, this study included Diener, Emmons, Larsen, & Griffin's (1985) satisfaction with life scale, one of the most widely used subjective well-being scales used in psychological research. The satisfaction with life scale is a 5-item self-report instrument measured on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). An example item is: "In most ways my life is close to ideal." The Cronbach alpha coefficient indicated adequate reliability for this instrument ($\alpha = .85$). A mean score was calculated to be correlated with other variables in the final analysis. A high mean score indicated greater satisfaction with life.

Results and Discussion

The following section presents the results and interpretation of the data, as related to the four hypotheses stated in the introduction, and a discussion of findings. The final analysis used SPSS, version 22.0.

Hypothesis One

H1 predicted that there would be a significant positive correlation between collectivistic attitudes and norms and compulsive usage of smartphones, so that smartphone users who reported greater collectivistic attitudes and norms would report greater compulsive usage of smartphones. Using a Pearson correlation analysis for all participants ($n = 214$), Singelis's (1994) collectivistic attitudes instrument (CollA94_mean), Singelis's (1994) collectivistic descriptive norms instrument (CollN94_mean), Triandis & Gelfand's (1998) collectivistic attitudes instrument (CollA98_mean), and Triandis & Gelfand's (1998) collectivistic descriptive norms instrument (CollN98_mean) significantly correlated with one another ($p < .001$) (see Table 1). These significant correlations indicate that those who reported greater collectivistic

norms for one scale would report greater collectivistic norms in the other. This was also true for the collectivistic attitudes scales, confirming that these scales aligned to report both collectivistic attitudes and norms. Furthermore, significant correlations between the two collectivistic attitudes scales and the two collectivistic norms scales indicate that those who hold greater collectivistic attitudes report greater collectivistic descriptive norms, such that they view their social group as more collectivistic. This supports the general assumption that one's own attitudes and norms align with those of one's social group due to cultural forces (Shteynberg, Gelfand, & Kim, 2009, p. 47-48). Based on the results of a Pearson correlation analysis, H1 was marginally supported only by the significant correlation ($r = .158, p = .021$) between compulsive usage of smartphones (Comp_mean) and Singelis's (1994) collectivistic attitudes scale (CollA94_mean), which indicated that greater compulsive usage of smartphones was related to greater collectivistic attitudes, with 2.5% of the variance in compulsive usage of smartphones accounted for by collectivistic attitudes (see Table 1). CollN98_mean, CollN94_mean, and CollA98_mean did not significantly correlate with Comp_mean. The results indicate that collectivistic attitudes related to compulsive usage of smartphones better than collectivistic descriptive norms, such that one's own collectivistic attitudes influence compulsive usage more than one's cognitions about the typical beliefs and values of one's cultural group. This may indicate that people are more likely to become compulsive users because they personally believe that they are obligated to keep up with their smartphones to promote group harmony and attend to others above and beyond their own interests. CollA94_mean had the highest mean score (mean = 4.84) compared to CollA98_mean (mean = 3.64), CollN98_mean (mean = 3.59), and CollN94_mean (mean = 3.43), such that participants associated the most with collectivistic culture when reporting their personal attitudes in Singelis's (1994) scale. This helps to support H1 because the greatest mean score,

indicating greater collectivistic views, significantly related to compulsive usage above and beyond the other scales that indicated lower collectivistic views. Furthermore, Singelis's (1994) attitudes and norms scales correlated with compulsive usage more than Triandis & Gelfand's (1998) scales. In their study, Shteynberg, Gelfand, & Kim (2009) found no significant difference in the scores between Singelis's (1994) scales and Triandis & Gelfand's (1998) scales. However, they carried out their study cross-culturally, such that participants included South Koreans and Americans. My findings could be influenced by the fact that participants in my study were students attending an American university in the same country. In fact, out of the 27,410 students who enrolled at the University of Tennessee in Fall 2014, only 23% of students identified as non-white (*Enrollment data: 2014-2015*). Furthermore, out of those 23% students, it is conceivable that an even smaller percentage would identify as collectivistic. As such, this limitation may have skewed the data so that results were much less pronounced than if the study was conducted with individuals from different countries (Japan and America, for example).

Table 1

Pearson Correlations Between All Four Attitudes and Norms Scales and Compulsive Usage of Smartphones

Variable	CollN98_mean	CollN94_mean	CollA98_mean	CollA94_mean	Comp_mean
CollN98_mean	-	.409**	.564**	.396**	-.056
CollN94_mean	-	-	.435**	.483**	.127
CollA98_mean	-	-	-	.587**	.097
CollA94_mean	-	-	-	-	.158*
Comp_mean	-	-	-	-	-

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Hypothesis Two

H2 predicted that there would be a significant positive correlation between compulsive usage of smartphones and technostress. Based on the results of a Pearson correlation analysis, H2 was strongly supported by a significant correlation ($r = .524, p < .001$) between compulsive usage of smartphones and technostress, which indicated that greater compulsive usage of smartphones was related to greater technostress, with 27.46% of the variance in technostress accounted for by compulsive usage of smartphones.

Hypothesis Three

H3 combined H1 and H2 and predicted that compulsive usage of smartphones would mediate the relationship between collectivistic attitudes and norms and technostress. Since Singelis's (1994) collectivistic attitudes scale was the only collectivistic scale that significantly correlated with compulsive usage of smartphones, rather than analyzing all collectivistic attitudes and norms scales, I focused on Singelis's collectivistic attitudes scale (CollA94_mean) for the mediation analysis. Thus, H3 was altered to analyze the following simple mediation model – collectivistic attitudes \rightarrow compulsive usage of smartphones \rightarrow technostress – using a tool created for SPSS called PROCESS (Hayes, 2013). Excluding technostress from the analysis, the PROCESS procedure found a marginally significant positive correlation between collectivistic attitudes and compulsive usage of smartphones ($r = .235, S.E. = .098, t = 2.406, p = .017$). With collectivistic attitudes and technostress in the equation, the PROCESS procedure found a significant positive correlation between compulsive usage of smartphones and technostress ($r = .585, S.E. = .068, t = 8.635, p < .001$). Based on the results from the PROCESS procedure, there was no evidence of a direct effect of collectivistic attitudes on technostress. The direct effect was not statistically different from zero (coeff. = .128, $S.E. = .098, t = 1.311, p = .1912$). There was

evidence of an indirect effect of collectivistic attitudes on technostress as mediated by compulsive usage of smartphones (coeff. = .137). The lower level of the bootstrap confidence interval was listed as .021 and the upper limit was listed as .294; the bootstrap standard error, “the standard deviation of the 10,000 bootstrap estimates of the indirect effect,” was .068 (Hayes, 2013, p. 110). Thus, the altered H3 was supported. Although Singelis’s descriptive norms scale (CollN94_mean) did not correlate with compulsive usage of smartphones, I conducted an additional mediation analysis using the PROCESS procedure to determine whether collectivistic descriptive norms would, in fact, influence technostress if mediated by compulsive usage of smartphones. Excluding technostress from the analysis, the PROCESS procedure, like the correlation analysis conducted for H1, did not find a significant positive correlation between collectivistic descriptive norms and compulsive usage of smartphones ($r = .287$, $S.E. = .149$, $t = 1.930$, $p = .055$). With collectivistic descriptive norms and technostress in the equation, the PROCESS procedure found a significant positive correlation between compulsive usage of smartphones and technostress ($r = .607$, $S.E. = .067$, $t = 9.006$, $p < .001$). Based on the results from the PROCESS procedure, there was no evidence of a direct effect of collectivistic descriptive norms on technostress. The direct effect was not statistically different from zero (coeff. = $-.109$, $S.E. = .148$, $t = -.740$, $p = .460$). There was evidence of an indirect effect of collectivistic descriptive norms on technostress as mediated by compulsive usage of smartphones (coeff. = .174). The lower level of the bootstrap confidence interval was listed as .017 and the upper limit was listed as .388; the bootstrap standard error was .092. This provides support, although minimal, for the initial H3 that compulsive usage of smartphones would mediate the relationship between both collectivistic attitudes and descriptive norms and technostress. Hayes (2013) describes his PROCESS procedure in *Methodology In The Social Sciences: Introduction*

to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach and explains a limitation to the process that could have affected this study. He states, “If the original sample is very small, an unusual case or two are highly likely to appear in a bootstrap sample multiple times, and this can distort a bootstrap analysis” (p. 110).

Hypothesis Four

H4 predicted that there would be a significant negative correlation between technostress and satisfaction with life. Based on the results of a Pearson correlation analysis, those who reported greater technostress reported lower satisfaction with life, but the correlation was not significant ($r = -.022, p = .747$). Thus, H4 was not supported.

Discussion

There was only marginal support for H1, which proposed that culture – collectivistic attitudes and descriptive norms – would affect compulsive usage of smartphones. Although it would appear that culture would have had a greater influence on smartphone usage, as demonstrated in the introduction, the results did not indicate an influence to the extent that was expected. As was found in Lee, Chang, Lin, & Cheng’s (2014) study, there was strong support for H2, which proposed a significant positive correlation between compulsive usage of smartphones and technostress. There was marginal support for H3, which proposed that greater collectivistic attitudes and descriptive norms would result in greater technostress as mediated by compulsive usage of smartphones. Again, the results did not support the simple mediation model to the extent that was expected. Furthermore, H4 was not supported; greater technostress did not significantly decrease satisfaction with life.

Although my predictions were intended to demonstrate a logical continuity between previous research and this present study, the results do not support such continuity. However, it

is conceivable that several limitations prevented accurate and adequate support for my hypotheses. For example, the discrepancy between expected and observed results could be explained by the fact that collectivist and individualistic cultures view social obligation differently, such that those in individualistic cultures are driven by controlled motives (the “should” of one’s motivational system) that represent internalized external pressures that control [one’s] behavior through guilt, anxiety, or a desire to please others” (Janoff-Bulman & Leggatt, 2002, p. 261). Compare to individualist cultures that emphasize independence and priority of personal happiness, collectivist cultures emphasize the well-being of the group and are driven by more autonomous motives (the “wants” of one’s motivational system) (p. 261). Janoff-Bulman & Leggatt (2002) stated, “It is possible that the same social obligations that are viewed as controlled and burdensome by some may nevertheless be regarded as desirable and self-determined by others (p. 261). In fact, “autonomous motives, as compared to controlled motives, are associated with better psychological adjustment and well-being...[People] clearly fare better when [they] engage in the wants rather than the should of [their] behavioral repertoire (p. 261). Furthermore, “those in individualist cultures might assume that a tight world of defined obligations, such as that found in collectivist cultures, would be unpleasant and overly demanding. People in individualist cultures are apt to view obligations negatively, as constraints on their personal freedom” (p. 261). Thus, those who report greater collectivistic attitudes and descriptive norms may not, to the extent that was expected, report greater technostress as a result of compulsive usage or report decreased satisfaction with life as a result of technostress. As opposed to the argument presented in the introduction, those who align more with collectivist cultures may not view the obligations tied to smartphones - keeping up with emails or returning texts or calls in a timely matter – negatively, such that it does not decrease subjective well-being.

As mentioned in the hypothesis one subsection of the results and discussion section, there was one major limitation that is likely to have contributed to this study's lackluster results – sampling from students from an American university within a country customarily characterized with an individualistic culture. As mentioned, only a small group of individuals who attend the University of Tennessee identify as non-white. Even out of that subgroup, some may still identify with individualistic cultural attitudes, values, and norms. As such, it is likely that many of the participants have deeply ingrained individualistic attitudes and norms. Thus, the results – indicating a marginally significant positive relationship between collectivistic attitudes and compulsive usage as well as the results indicating a marginally significant relationship between collectivistic attitudes and norms and technostress as mediated by compulsive usage of smartphones – are still impressive, given the context of this study.

For future research, it may be critical to sample from countries that are distinctly individualist or collectivistic. Results from these studies may indicate greater significance to the extent that was initially expected. Furthermore, future research should take into account the results found in Shteynberg, Gelfand, & Kim's (2009) cross-cultural study. They found that “both Singelis-based scales and Triandis and Gelfand-based scales [indicated] that Americans see themselves as more collectivistic than they see other Americans” (p. 64). Conversely, “South Koreans rated themselves as less collectivistic than they rated other South Koreans. It is thus possible that both Americans and South Koreans prefer to think of themselves as possessing those attitudes and values that their society is missing the most” (p. 65).

Results for H4 – greater technostress did not significantly decrease satisfaction with life – was surprising. As was described in the introduction, it would seem that constant pressure to be accessible by others anywhere at anytime and feeling obligated to check one's phone for missed

emails and phone calls would have a significant negative impact on one's subjective well-being. However, the results did not indicate as such. The fact that this study did not include a scale for daily stress levels may have been a limitation. Rather than assuming that technostress directly affects satisfaction with life, it may be that technostress influences satisfaction with life as mediated by daily stress (or other variables not considered). For example, Lepp, Barkley, & Karpinski (2014) found a mediated relationship between [cell phone use] and subjective well-being, which was also measured by the Satisfaction with Life Scale (p. 348). However, they also noted that much more research is needed in order to determine what other variables mediate the relationship. Furthermore, in their study involving qualitative research methods, Oulasvirta, Rattenbury, Ma, & Raita (2012) found that repetitive habitual use was experienced, at worst, as more annoying than addictive (p. 105, 107). As such, perhaps the "gravitational tug" expounded upon in the introduction is not as negative as was assumed; perhaps, smartphone usage – described as habitual, compulsive, or addictive – is a negative aspect of modern technology, but not to the extent that was initially suggested. Technostress is described as an inability to adequately adapt to continually advancing technology. However, the positive aspects may outweigh the negative aspects for the majority of smartphone users. It is likely that most people are adequately adapting to the introduction, expansion, and advancement of smartphones and are able to incorporate such technology in a positive manner, even if there are some negative consequences (as is the case with most aspects of life). With the positive, comes the negative. It is up to the individual to adapt adequately, and as the results suggest, the majority of smartphone users may be adapting to such technology in a healthy manner.

Nevertheless, previous research and this study on smartphone usage have important implications. For those who are unable to cope with technological advancement in a healthy

manner, it is critical to study the appropriate use of modern communication technology. This study assists in the development of awareness and further adds to the literature identifying the most appropriate use of technology. However, more research is critical since the literature is still limited compare to other psychological constructs. Continued research will help develop and test interventions or treatment plans that help individuals – college students and younger adolescents, who use such technology at a rapid rate – learn how to cope with such technology in a healthy manner. For example, Lepp, Barkley, & Karpinski noted research on a simple prompting procedure that “significantly reduced cell phone use while driving relative to a pre-intervention baseline” (p. 349). For now, with limited research, they suggest that individuals at least monitor their use and understand that technology does have negative aspects that could be potentially devastating (such as vehicle accidents due to cell phone use) (p. 349). Kennen (2014) suggests that individuals, perhaps through the assistance of a clinician, “decrease their reliance on modern communication technology and make certain boundaries within their life” (p. 40). To conclude, I end with a quote from *Times*’ “Never Offline” issue that illustrates the direction in which modern technology is heading:

Apple Watch signals the advent of an always-there Internet, an Internet that can’t be put away. We’re used to dabbling just our fingertips in the Internet, but the Apple Watch doesn’t stop there. It tracks your movements. It listens to your heartbeat. It puts your whole body online. Exactly how personal do we want to get? (Grossman & Vella, 2014, p. 42)

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