PERSONALITY TRAITS, SMARTPHONE USAGE AND SMARTPHONE ADDICTION: THEIR RELATIONSHIPS AMONG UTAR UNDERGRADUATE STUDENTS

NURUL AIN BINTI ABD RAHIM

SIAH YIH HUANG

TEE XIANG YI

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Nurul Ain Abd Rahim, Siah Yih Huang, and Tee Xiang Yi

Universiti Tunku Abdul Rahman

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NURUL AIN BINTI ABD RAHIM

SIAH YIH HUANG

TEE XIANG YI

APPROVAL FORM

This research paper attached hereto, entitled: "Personality Traits, Smartphone Usage and Smartphone Addiction: Their Relationships among UTAR Undergraduate Students" was prepared and submitted by Nurul Ain binti Abd Rahim, Siah Yih Huang and Tee Xiang Yi in partial fulfillment of the requirements for Bachelor of Social Science (Hons) Psychology is hereby accepted.

_____ Date: _____

Supervisor

Dr. Siah Poh Chua

Abstract

The present study explores the role of smartphone usage as mediator in the relationship between extroversion and smartphone addiction among UTAR undergraduate students. A total of 318 participants were recruited via purposive sampling in UTAR Kampar Campus. Data were collected using paper-and-pencil survey and online survey via Google Forms, which included items from International Personality Item Pool-Five Factor Model-50 (IPIP-5-50), Process and Social Usage Scale and Smartphone Addiction Inventory scale (SPAI). The data were analysed using Statistical Package for Social Science (SPSS) statistical software 23th version. Results showed that there was a significant negative correlation between extroversion and process usage of smartphone, process usage positively correlated to smartphone addiction and extroversion was not correlated to smartphone addiction. Mediation analysis revealed that a complete mediation was found in the relationship between extroversion and smartphone addiction via process usage of smartphone. In contrast, social usage of smartphone did not act as the mediator in the association between extroversion and smartphone addiction. The results shed light on the underlying mechanism of how extroversion may lead to smartphone addiction. It also indicated that individuals shall pay attention to the process usage of smartphone as it acts as an underlying mechanism between extroversion and smartphone addiction. The utilisation of process usage of smartphone shall be reduced as it may lead to smartphone addiction which cause many adverse impacts.

Keywords: smartphone addiction, extroversion, purpose of smartphone usage, undergraduate students, mediation

DECLARATION

We declare that the data and materials presented in this paper are the end results of our own work and that due acknowledgement has been given in the bibliography and references to ALL sources, regardless of them being electronic, printed or personal.

Name: Nurul Ain binti Abd Rahim

Student ID: 16AAB00530

Signature:

Date: 19th Nov 2018

Name: Siah Yih Huang

Student ID: 16AAB00849

Signature:

Date: 19th Nov 2018

Name: Tee Xiang Yi

Student ID: 16AAB00563

Signature:

Date: 19th Nov 2018

Table of Contents

List of Tables

List of Figures

List of Abbreviations

BT Logs	-	Bluetooth Scans Logs
CGPA	-	Cumulative Grade Point Average
DSM-5	-	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
IPIP-5-50	-	International Personality Item Pool-Five Factor Model-50
MIROS	-	Malaysian Institute of Road Safety Research
MIM	-	Mobile Instant Messaging
MVM	-	Muslim Volunteer Malaysia Association
UTAR	-	Universiti Tunku Abdul Rahman
SPAI	-	Smartphone Addiction Inventory
SMS	-	Short Message Service
SNS	-	Social Network Services
SPSS	-	Statistical Package for Social Science

Chapter I

Introduction

Background of Study

Due to the improvement of information technology, smartphone use is prevalent in today's world. According to Statista (2018), the number of smartphone users in Malaysia reached 19.9 million in 2017. A steady rise in the percentage of smartphone users within these few years marked the upward trend of smartphone markets in Asia-Pacific countries in the coming years. Wang, Lee, Yang, and Li (2015) stated that many individuals treat smartphones as incredible tool in terms of entertainment, information upgrade, immediate communication, social relationship, and self-education. Smartphones provide conveniences for users regardless of being within range of mobile service or otherwise, which in turn supporting this trend (Nakamura, 2015). As smartphones bring conveniences in daily lives, they are used intensely by Malaysians.

Overuse of smartphone results in habit formation and smartphone addiction (Aljomaa, Al.Qudah, Albursan, Bakhiet, & Abduljabbar, 2016; Elhai & Contractor, 2018). There are absence of diagnostic criteria to characterise the excessive patterns of smartphone use (Kim et al., 2016), but many researches demonstrated similar patterns of addiction characteristics found in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5).

Individuals exhibiting addictive symptoms may experience various harmful effects in daily life, including the aspects of mental health (Fullwood, Quinn, Kaye, & Redding, 2017; Gutiérrez, de Fonseca, & Rubio, 2016; Hong, Chiu, & Huang, 2012; Long et al., 2016; Matar Boumosleh & Jaalouk, 2017; Rozgonjuk, Rosenvald, Janno, & Tähtet, 2016; Tao et al., 2017; Van Deursen, Bolle, Hegner, & Kommers, 2015), physical health (Kim, Kim, & Jee, 2015), behavioural problems (Gutiérrez et al., 2016; Roberts, Pullig, & Manolis, 2015) and social

relationships (Lee & Lee, 2017; Panda & Jain, 2018). Attention should be given towards smartphone addiction issues. Strategies in reducing or preventing individuals from getting addicted towards smartphones can be suggested as more and more individuals may exhibit high risk of smartphone addictive behaviours, which are accompanied by various side effects.

In particular, personality psychology gives attention to individuals' affective, behaviour, cognition and desire (Wilt & Revelle, 2015). This is applied in our study, whereby combining with the reasons for university students to utilise smartphones given by AlBarashdi, Bouazza, Jabur, and Al-Zubaidi (2016), it is logic that they use smartphones to satisfy desires, experience positive emotions and escape from undesirable situations. The heavy usage of smartphones eventually lead to smartphone addiction. Personality traits received enormous support in forecasting and understanding individuals' mental health functioning (Wilt & Revelle, 2015).

Among the Big Five personality traits, extroversion is chosen due to several reasons. Firstly, there are trends showing that individuals prefer the new way of socialising through smartphones. There were statistics showing that particularly social networks had rapid increase in terms of popularity, and this increased the duration spent on smartphones (Chaffey, 2018). Poushter, Bishop, and Chwe (2018) claimed that social media usage continued to rise in developing countries. Besides, extroversion nature, such as facilitating goals to entertainment, connecting with others and cherishing others (McCabe & Fleeson, 2012), describe the main activities of using smartphones, which may promote smartphone addiction. According to Bahrampour (2018), the measurements of all the five traits in Big Five personality test might lessen or increase the severity of addiction, leading to inaccurate results. Therefore, extroversion is solely focused in this study.

Smartphone usage has not been frequently studied as the mediating variable in between personality traits and smartphone addiction. The existing gap may need to be filled

in to understand the underlying mechanisms which can better explain the phenomena of smartphone addiction in terms of individual differences and their preferences. This will be described further in the problem statement and literature review.

Problem Statement

According to Qader and Omar (2015), generation Y (born between 1977 to 2000) has mastered technology compare to generation X as they live in the era of computer, internet and smartphone. Thus, generation Y will bear most of the negative impact of technology. Parasuraman, Sam, Wong, Lau, and Lee (2017) claimed that individuals, especially university students utilise smartphones because of the attractive and multiple functions of smartphones. Parasuraman et al. (2017) found that most participants displayed smartphone addiction, but did not aware of the situation. Among them, 75.6% belonged to the 21 and 25 years old age group. This is the average age range of university students. Besides, university students rely on smartphones because it allows them to avoid direct communication and promote virtual group belongingness, enjoy entertainment functions to relieve from uncomfortable events and obtain information (AlBarashdi et al., 2016). Undergraduates' high demands towards smartphones lead to them being the focus of this study to understand the prevalence rate and reasons of using smartphones.

Compulsive usage of smartphone also produces negative effect on academic performance (Lee & Lee, 2017; Matar Boumosleh & Jaalouk, 2017). According to Yahaya (2013), smartphone becomes the tool of choice for 29% of students to search for information for online learning. A study conducted among Malaysian university students revealed that the higher the rate of smartphone usage for learning purposes in tertiary education, the lower their cumulative grade point average (CGPA) (Ng, Che-Hassan, Nor, & Malek, 2017). The lower CGPA obtained was due to the multi-tasking activity performed while undergoing

learning process in class, which disrupted their concentration. For example, they might view lecture notes on the smartphone while texting a friend. This phenomenon is known as cyberloafing. According to a study conducted by Gökçearslan, Uluyol, and Şahin (2018), cyberloafing had positive correlation with smartphone addiction.

It is not even a surprise when smartphone usage during driving and riding had become the main contributor to road accidents in Malaysia (Malaysian Institute of Road Safety Research [MIROS], 2017). According to MIROS (2017), young Malaysian drivers and riders are the most susceptible to accidents. One of the main risk factor is smartphone usage while driving and riding (Bedi, 2011). Malaysians in particular love to use smartphone to find location through applications like Waze and Google Maps. They also prefer to scroll social media while waiting for the green light or even during passive driving on straight highway. All these behaviours definitely are distracting as driving on road is proven by research to be a multi-tasking skill (Nijboer, Borst, van Rjin, & Taatgen, 2016), whereby multi-tasking skills are fully utilised by youths, particularly students, as mentioned previously.

Besides, Tang (2016) revealed the result of a study by Muslim Volunteer Malaysia Association (MVM) that showed 97% out of 25,632 public university students in Malaysia need financial assistance. This situation can be attributed to the students' spending habit. A survey by Asian Institute of Finance revealed that 40% of Malaysian aged from 20 to 33 years old were overspending their money despite getting help in terms of tuition fees and living expenses (Tang, 2016). Investment on the latest expensive smartphone apart from grand weddings, oversea trips and even branded stuffs can become the reasons behind this situation (Pui, 2017). According to Maxim (2016), younger generations are said to have more money that enable them to buy pricy high-tech smartphones. Nagarkoti (2009) had justified that young generations buy branded smartphones due to the perceptions that expensive smartphone represents ideal quality compare to the rest.

The purpose of smartphone usage also determines the applications' installed in smartphone. Application definitely colours smartphone function by adding extra functions to the device. However, a study conducted among college students in Hong Kong showed that dating application was associated with high risk sexual behaviour among individuals, like having multiple sexual partners and unprotected sexual activity. Besides, statistics by Bukit Aman revealed that applications like Wechat and Beetalk were believed to be the major applications used to catch sexual preys (Chow, Say, Zainol, Yee, & Yee, 2016). In other words, smartphone addiction may indirectly lead to sexual assault among youth.

All the issues that link young generations and smartphone addiction have strengthened the need to conduct a study on smartphone addiction among university students. A study based on personality traits need to be quantitatively done to investigate the root problem within students themselves. However, smartphone usage depends on the preferences chosen by university students, especially in accordance with their personality traits.

The role of smartphone usage as mediator has not been explored much in the relationship between personality traits and smartphone addiction. Question on conditions in which extroversion plays a role in smartphone addiction deems further description of the mechanism involved, which in this study is the smartphone usage. The extroversion nature of individuals may exhibit certain tendencies in performing smartphone usage behaviours and therefore influencing the addictive behaviours of using smartphones. The decision to use or avoid using smartphones is linked with psychological characteristics of individuals (Kim, Briley, & Ocepek, 2015). Depending on personality traits to satisfy needs, the extent of performing certain smartphone usage behaviours changes the severity of smartphone addiction. The smartphone usage may facilitate individuals nature in seeking social connectedness or satisfying other purposes such as information seeking and subsequently relate to smartphone addiction. Thus, there is a need to conduct a study in a mediating

framework to determine whether smartphone usage may mediate the relationship between personality traits and smartphone addiction.

Research Objectives

The main objective of this study is to test whether smartphone usage, namely social or process usage are able to mediate the relationship between extroversion and smartphone addiction or otherwise. It is important to detect any mediating variable which may help in addressing issues on smartphone addiction so that better action plans can be carried out in the future. However, in order to establish the mediating relationship, the relationships between variables are needed to be established from our data. Therefore, the research objectives include the determination of whether extroversion has significant relationship with smartphone addiction. The relationship between extroversion and smartphone usage as well as the relationship between smartphone usage and smartphone addiction are also being tested.

Significance of Study

From this study, we hope to contribute the data collected into understanding the pattern of smartphone addiction among Malaysian university students. Since smartphone addiction has become an alarming issue globally, there is a need to address the issue locally with statistical evidence to increase the awareness of our society, especially youngsters about the silent danger of smartphone apart from its magical touch in helping easing out daily life tasks. The results of this study can be readily used and even published in the UTAR monthly magazine to alert UTAR communities that smartphone addiction is no longer a laughing joke. With the data, hopefully UTAR students will no longer practise using smartphones during driving and learning sessions. Therefore, less accidents may happen in and out of campus area while learning process can occur in a more effective and interactive method.

Besides, this study can suggest the Ministry of Higher Education or even UTAR in controlling smartphone addiction by constructing and implementing special rules and regulations regarding smartphone usage in classes. Despite its beneficial usage, it seems that incidences like cheating in examination and concentration problem in class with too much dependency on smartphone lead to lower CGPA among university students. This issue might lead to poorer quality of undergraduates. Students may require an external controller to monitor these incidences. According to The Star Online, 70% of local employers were not satisfied with the local undergraduates, claiming most of them were at average level only ("Poor ratings for fresh graduates", 2016). Thus, implementing special rules to control usage of smartphone in campus area may reward better academic performance among Malaysian university students, leading to better quality undergraduates and increased in the number of hired undergraduates. This definitely tallies with UTAR achievement in securing job placement for 97.27% out of 2000 job placements after graduation (Carvalho, 2015).

Bershidsky (2017) claimed that the blame on smartphone addiction should be on the applications invented and not the smartphone itself. This article raises an issue whether the applications or the phone itself is the major cause that leads to the rise in smartphone addiction. Hopefully, through this study, clarification on this matter can be made and no wrong actions are taken against this issue. This can determine whether the applications are the ones need to be monitored or the smartphone production shall be controlled.

Most importantly, answers on the role of smartphone usage as mediator will help students to be more alert on how they utilise their smartphones. Through this, university students can have better plans in the future on how to utilise their smartphones and perhaps allocate certain time to use it. They shall realise and reflect the pattern of their usage. They can be prone to either social usage, process usage or even both. The knowledge about the usage can guide them in monitoring their smartphone usage. Moreover, the results of this

study can help the educators, psychologists and counsellors to identify those high risk students and perform early intervention and prevention to prevent worst-case scenario regarding smartphone addiction.

This study is also important to raise the awareness of the mere importance of intrinsic factor within individuals that may influence their behaviours in the environment, thus leading to smartphone addiction. Less studies focus on personality factor, which is an intrinsic factor. More emphasization is given to factors like gender (Chen et al., 2017a; Chen et al., 2017b; Nayak, 2018). This is important as people need to be aware of their own traits to acknowledge their tendency to develop smartphone addiction. This can help them to take extra precautions to control their own smartphone usage, like installing applications to monitor the usage. There is no doubt that university students spend most of their time with smartphones for multipurpose function. Since they are not aware of this silent addictive behaviour, awareness campaigns can be done in classrooms and around campus area to ensure students are aware of their own personality traits and more proactive in managing their behaviours.

Research Questions

1. Is there any significant relationship between extroversion and smartphone usage?
2. Is there any significant relationship between smartphone usage and smartphone addiction?
3. Is there any significant relationship between extroversion and smartphone addiction?
4. Does smartphone usage mediate the relationship between extroversion and smartphone addiction?

Hypotheses

H1: There is a significant negative relationship between extroversion and process usage.

H2: There is a significant positive relationship between process usage and smartphone addiction.

H3: There is a significant positive relationship between extroversion and smartphone addiction.

H4: Process usage would mediate the relationship between extroversion and smartphone addiction.

Conceptual Definition

Personality traits. Extroversion trait is related to the way individuals attain energy in social interaction. Extroverts tend to be outgoing and gain energy from social interaction while introverts prefer individual works and gain energy from their inner thoughts and inner world.

Extroversion is defined as a personality trait that can be characterised as talkative, happy-go-lucky and outgoing whereby individuals prefer to be in the centre of social interaction. It is one of the personality traits proposed by Eysenck and Eysenck (1969, as cited in Feist, Feist, & Roberts, 2013) who defined a person as sociable and impulsive as well as jocular, lively, quick-witted and optimistic. Extroverts are the type of people who have more social relationships than introverts (Brown, 2015). According to Cherry (2018), extroverts are outgoing, tunely outward, action-oriented and feel comfortable interacting with strangers. Extroverts often are self-confident, competitive and open to sharing with others (Panda & Jain, 2018). Sultan (2014) claimed that extroverts are energised by being around people and interacting with others.

Introversion is the personality trait opposite to extroversion in which introverts are less sociable. Introverts need time alone to re-energise after social interaction (Sultan, 2014). It is characterised by a person who is less talkative, passive, unsociable, careful, reserved, thoughtful pessimistic, peace-lover, sober and in control (Eysenck & Eysenck, 1969, as cited in Feist et al., 2012). According to Cherry (2018), introverts turn everything inward, being thoughtful and have preference for deep and meaningful interpersonal interaction. Introverts are quiet and reflective, who choose to be alone and avoid large social situations that use up their energy (Eysenck & Eysenck, as cited in Sultan, 2014).

Smartphone usage. Smartphone usage can be categorised into process usage and social usage. Elhai, Levine, Dvorak, and Hall (2017a) defined process usage as the engagement of smartphone users in searching and reading news, entertainment, relaxation and other non-social activities. In contrast, social usage is the engagement of smartphone users in social activities, including social networking, messaging, handling phone calls and maintaining relationships.

Smartphone addiction. Smartphone addiction refers to the repetitive and persistent smartphone checking behaviours to maximise potential rewards and compensate potential threats (Wang et al., 2015). According to Cha and Seo (2018), it is the action of continuously using smartphone without the ability to control the usage despite knowing the harmful effects towards oneself. It is led by the pleasure and excitement that initially arise from the smartphone use and disrupts individual and society in the long term (Gökçearslan, Mumcu, Haşlaman, & Çevik, 2016). Smartphone addiction is considered as a behavioural addiction (Cha & Seo, 2018; Matar Boumosleh & Jaalouk, 2017; Rozgonjuk et al., 2016; Savci & Aysan, 2017; Van Deursen et al., 2015). The signs of smartphone addiction are feeling

anxious when phone is not around, continuously checking phone for no reason, poor performance as the result of prolonged activities, constantly checking communication updates and be distracted with smartphone applications (Parasuraman et al., 2017).

Operational Definition

Personality traits. Personality trait in this study will be measured in terms of extroversion. Ten items of extroversion trait from the 50-item International Personality Item Pool (IPIP) by Goldberg (1992) are extracted and made use to measure the extroversion level of participants. Although there are four remaining traits in the IPIP, extroversion is the only scale used as it is relevant to be measured in this study. The final score of extroversion trait is calculated according to the proposed manual in which the score of all items (both the positively keyed and the negatively keyed or reversed items) will be summed up to obtain the total extroversion scale score. Higher score will indicate that the participant is socially outgoing while lower score indicate a tendency towards introversion personality trait.

Smartphone usage. Smartphone usage refers to the different purposes of using smartphone to satisfy individual needs and to complete everyday tasks. In this study, smartphone usage is categorised into two types, which are process and social usage. Both types will be measured using the Process and Social Usage scale, a 12-item scale created by Van Deursen et al. (2015). The total sum of each type will be obtained. The higher score of a usage type will indicate the person having inclination towards that particular type of usage.

Smartphone addiction. Smartphone addiction is the uncontrollable overuse of smartphone although the users are well-aware of the resulting negative effects. Smartphone Addiction Inventory Scale (SPAI) by Lin et al. (2014) is used to measure the participants'

smartphone addiction level in terms of their compulsive behaviours, functional impairment of daily life activities, withdrawal and tolerance to smartphones. The total sum of all items is calculated after they have been completed. A higher summed score will indicate a higher level of smartphone addiction.

Chapter II

Literature Review

Personality Traits and Smartphone Usage

There is a need to categorise smartphone usage (Van Deursen et al., 2015). Song, Larose, Eastin, and Lin (2004) claimed that empirical studies showed a mixture of process and social use, and the literature suggested that the basic motivations for using technology are nearly similar. This categorisation is applied to smartphone usage (Van Deursen et al., 2015). The purpose of smartphone usage can be explained using both process and social features of smartphones (Cha & Seo, 2018). Individual differences in the predispositions of behaviours may predict their smartphone usage as they may represent respective individual characteristics. Researches were done to investigate the association between personality traits and purpose of smartphone usage.

Kim et al. (2015) conducted a study among South Korean population to explore the sociodemographics and personality as predictors of smartphone application usage. Extroversion was shown to be able to predict smartphone use. Five categorisations of application usage were used in this study, namely e-commerce (finance applications and shopping), entertainment (games, musics, videos, pictures and sports applications), information (lifestyle and news applications), literacy (education, book and reference management applications) and relational (social-network and instant messaging applications) usage. These were similar with Elhai et al.'s (2017a) classification, whereby the process usage included e-commerce, entertainment, information and literacy applications usage, whereas the social usage corresponded with relational applications usage. The results showed that the more one was extroverted, the lesser the usage of literacy applications and the more

the usage of relational applications. However, extroversion was not correlated with e-commerce, entertainment and information application usage.

Lane and Manner (2011) investigated which smartphone functions were most important towards individuals with particular personality types. Survey method was used to collect data. It was found that extroverts greatly valued smartphones texting function. This might due to their strong desire for communication, and texting was an easy method to connect with others.

Surprisingly, Hong et al. (2012) found that there was no correlation between extroversion and purpose of smartphone usage. One of the limitations suggested was the possibility of inaccuracy in participants self-reported smartphone usage, such as the number of text messages and calls.

Most studies on smartphone usage relied on self-reports, which may serve as a source of bias. As a method to compensate this limitation, methods other than the survey form are preferred. Besides distributing personality questionnaires, Chittaranjan, Blom, and Gatica-Perez (2011) used a continuous nonintrusive and passive data collection software by including information from usage logs, such as SMS Logs, Call Logs, App Logs and Bluetooth Scans Logs (BT Logs). Instead of focusing on call and SMS, various functions in smartphones such as availability for web and internet usage, listening to music, watching videos, searching for maps and bluetooth files were given attention to. These multiple sources provided cues to analyse personality. The result showed a negative correlation between introverts and the use of internet applications. Besides having less frequency in using internet, few number of unique bluetooth IDs were detected. It was explained that introverts were less sociable, hence less likely to use smartphone functions for engagement and social purpose. In contrast, extroverts had higher chance to receive more calls with longer duration. The number

of unique contacts of extroverts was higher too. These showed that extroverts utilised smartphones for social purposes, such as to connect with others.

Montag et al. (2014) also conducted the study by measuring objective data of actual smartphone usage. The app named Menthal was installed in participants' smartphones to track their interaction, for instance data regarding phone calls and SMS. These data were stored in the smartphone database and sent to the server via internet line. The results indicated that call variables, such as the number of calls daily, number of unique contacts called and number of missed calls, were positively correlated with extroversion, but SMS was not linked with extroversion. It was explained that personality had connections with direct communication (calls) instead of indirect communication (SMS).

Montag et al. (2015) conducted another study using Menthal. This study specifically focused on WhatsApp, a major feature for easy communication with particular individual or group conversation using text or voice messages. The finding showed that WhatsApp contributed to a large portion of daily smartphone usage. The duration of daily WhatsApp usage was positively correlated with extroversion. It was pointed out that direct analyses of WhatsApp contents could not be done due to ethical issues. The content might provide a comprehensive view about the individuals' purpose of using the application, such as reading news or watching videos, instead of merely using it for social purposes.

In sum, there are differences in patterns of using smartphone, depending on the individual's personality traits.

Smartphone Usage and Smartphone Addiction

Van Deursen et al. (2015) suggested that smartphone usage types, or known as gratifications might contribute to habitual or addictive smartphone behaviours. Habitual

smartphone behaviours might be maladaptive whenever the automatic behaviours were activated by external or internal cues, and thus strengthened the habits if they brought positive outcomes. On the other hand, addictive smartphone behaviours viewed the act of using smartphones as a reward. The result showed that habitual smartphone behaviours positively predicted addictive smartphone behaviours. It was explained that the automatic drives of checking smartphone notifications would more likely rise the probability of developing addictive behaviours. The process usage of smartphone could positively lead to both habitual and addictive smartphone behaviours. Besides, process usage had an indirect effect on addictive smartphone behaviours via habitual smartphone behaviours, whereas social usage affected the development of habitual smartphone behaviours, and might indirectly lead to addictive behaviours. In general, habitual and addictive smartphone behaviours might be influenced by the rewards received when engaging in frequent checking of smartphones, regardless of the purpose was process usage or social usage. Both purposes of smartphone usage could link with addictive behaviours of using smartphones via direct or indirect pathway of different smartphone behaviours.

Elhai et al. (2017a) investigated the relationship between purpose of smartphone usage and psychopathology, namely anxiety and depression, which might associate with smartphone addiction. It was found that process usage of smartphone mediated the relationship between anxiety and smartphone addiction, whereby process usage acted as a mechanism for social avoidance and provided negative reinforcement for individuals with greater anxiety, and in the end, leading to smartphone addiction. In this study, it was known that process usage of smartphone was more associated with smartphone addiction.

Elhai, Hall, Levine, and Dvorak (2017b) then conducted another study on the purpose of smartphone usage and the relationship with smartphone addiction. The finding also showed that smartphone addiction was significantly more correlated with process usage in

comparison with social usage. It was emphasised that the smartphone functions might not be totally categorised under process or social usage due to the multipurpose of smartphone functions nowadays.

Bae (2017) examined the purpose of smartphone usage and smartphone addiction of middle and high school students in Korea. The usage for information seeking (search for news, surf the internet, search for product or service information, and search for traffic or location information), entertainment (search for and watch movies, television channels and videos, music, and read books, webtoon and novels online) and gaming purposes showed significant positive influence on smartphone addiction, but mobile social network services (SNS) and mobile instant messenger (MIM) did not show significant correlation with smartphone addiction. Gaming accounted for the largest effect to develop smartphone addiction, followed by information seeking and entertainment. These process usages of smartphone predicted smartphone addiction.

Similarly, Matar Boumosleh and Jaalouk's (2017) research claimed that smartphone usage for entertainment, not calling family members and reasons besides calling or texting friends, browsing news and for academic purposes, were significantly correlated with smartphone addiction. The act of not calling family members was treated as lack of family support, which might be associated with stress, and thus rendering more possibility to develop smartphone addiction. By categorising these purposes using process and social usage, it seemed that process usage partially predicted smartphone addiction as there were other usages under the same categorisation of process usage which did not demonstrate any significant correlation with smartphone addiction, such as reading news and study purposes. There might be other confounding variables to explain the inconsistencies of these results, such as personality traits or own preferences of using particular smartphone functions.

However, Lin et al. (2015) found that among Singaporean undergraduate students who use mobile phones, the use of internet, calls and texting had positive correlation with smartphone addiction. When smartphone users utilised more internet and messaging features, it was more likely to indicate smartphone addiction. Sociability was also positively linked with smartphone addiction and with three symptoms, namely productivity loss, felt anxious or lost, and withdrawal or escape. These indicated that social process was more associated with smartphone addiction in this study.

The majority of literature review regarding the relationship between the purpose of smartphone usage and smartphone addiction showed that process usage was more associated with smartphone addiction. The reasons to explain these inconsistent findings on whether process or social usage is more related to smartphone addiction still remain unclear (Elhai et al., 2017b; Song et al., 2004). However, it should be noted that particular function of smartphone may not be distinctive in their categorisation as merely a process or social activity (Elhai et al., 2017b). This may be described using Facebook application as an example. It is a social media, besides allowing a platform to connect individuals via messaging, sharing and liking posts, they can also play games and search for news and various information like cooking recipes.

In sum, the tendency to choose particular function of smartphone may be influenced by individuals' personality, whereby they prefer smartphone functions which could satisfy their purposes and needs. When they frequently receive pleasant experiences by involving in particular smartphone usage behaviours, it may lead to smartphone addiction when adverse impacts start to interfere with their daily lives. Further researches on smartphone usage should be done as the categorisation of process and social usage still lack of clear cut line due to the multifunctional smartphones.

Personality Traits and Smartphone Addiction

Various studies have been done on the relationship between personality traits and smartphone addiction. Personality trait varies among individuals and it can also impose reasons to provide understanding on individual's tendency to develop smartphone addiction. The focus of our study is personality traits in terms of extroversion.

Roberts et al. (2015) study was based on Mowen's model, a hierarchical model of personality which focuses on how personality traits affect behaviours. The model pathway showed a significant and negative relationship between introversion and smartphone addiction. It might due to the fact that individuals expressing shyness and bashfulness were less likely to be dependent on smartphones than extroverts as introverts were refrained from seeking connectedness.

Furthermore, Hong et al. (2012) investigated female university students' antecedents which could predict smartphone usage behaviours and smartphone addiction. There was a significant positive association between social extroversion and smartphone addiction. It could be said that female university students displaying smartphone addictive behaviours tended to make more phone calls and send more text messages.

Panda and Jain (2018) claimed that smartphone addiction may be regarded as excessive or compulsive use of applications and content of smartphones. The study also found that extroversion had the maximum influence on the tendency of individuals' compulsive smartphone usage. Extroverts are more likely to show compulsive usage of smartphones as they treated smartphones as convenient and effective communication devices.

Similarly, Takao (2014) found that extroversion significantly predicted smartphone addiction. The sociable and talkative nature of extroverts are more likely to be associated with smartphone addiction behaviours. Biglu and Ghavami (2016) also claimed that

extroversion was positively correlated with smartphone addiction. The more sociable the individuals were, the higher the tendency to show smartphone dependency in terms of symptoms, namely feeling anxious and lost, and withdrawal or escape (Lin, Chiang, & Jiang, 2015).

Lin et al. (2015) aimed to investigate sociability in smartphone and non-smartphone users and their mobile phone dependency. It was showed that mobile phone users who were more sociable would develop higher smartphone addiction and dependency symptoms, such as withdrawal or escape, and feeling anxious and lost. Sociability in mobile phone users was correlated significantly with dependency symptoms, showing a more severe level of dependency than non-smartphone users.

On the other hand, Horwood and Anglim (2018) researched the HEXACO and Five Factor Models of personality as predictors of smartphone addiction. Several items from the Mobile Phone Problem Use Scale (Bianchi & Phillips, as cited in Horwood & Anglim, 2018) were removed in accordance with the changes in culture norms, including the billing practices and phone interfaces. The result showed that extroversion had no significant relationship with smartphone addiction in both models of personality. It was explained that there was a revolution of mobile phones, changing from communication tools to internet-equipped devices, thus sociable extroverts may develop other behaviours instead of engaging in overuse of social media. Besides, individuals' positive personality may diminish the likelihood of using smartphones for social purposes to turn into compulsive nature.

Similarly, Pearson and Hussain (2016) aimed to investigate personality traits as predictor of smartphone addiction, but extroversion showed no significant correlation with smartphone addiction. From these both studies done by Horwood and Anglim (2018) as well as Pearson and Hussain (2016), it is seen that modern technology may change smartphones

nature, and it impacts the behaviours of using smartphones which may lead to addiction. The same findings had been demonstrated by a study performed through online survey by Hussain, Griffiths, and Sheffield (2017) on 640 smartphone users in which they found no association between extroversion and smartphone addiction. The explanation of such result might be attributed to the participants who underestimated their actual smartphone usage.

The majority of the studies is in accordance with the notion that extroversion could predict smartphone addiction. These inconsistencies of results between personality traits and smartphone addiction requires more researches to support their notions and discover the underlying mechanisms involved, such as the existence of mediator variables.

The Mediator Role of Smartphone Usage

There may be relationship between personality traits, in terms of extroversion and smartphone addiction, but individuals display different smartphone usage behaviours, which may influence the likelihood to develop smartphone addiction. The indirect association between extroversion and smartphone addiction being mediated by smartphone usage will be tested in this study.

Some researches which included these three variables, namely personality traits, the purpose of smartphone usage and smartphone addiction, had been done, with inconsistent results (Cocoradă, Maican, Cazan, & Maican, 2018; Horwood & Anglim, 2018; Lin et al., 2015). The majority of literature review showed that extroversion predicted social usage and smartphone addiction. The process usage was more likely to be associated with smartphone addiction, while the indirect mechanism of social usage might also predict smartphone addiction. As both extroversion and smartphone usage are predictors of smartphone addiction, as well as the possibility that smartphone usage may be an indirect mechanism, it is assumed

that smartphone usage may mediate the relationship between extroversion and smartphone addiction.

Cocoradă et al. (2018) found that the general use of smartphone, duration of usage and anxiety mediated the association between personality traits and smartphone addiction. The results showed that extroversion positively affected duration of smartphone usage and its general use. Both these factors had the strongest direct effects on smartphone addiction. Besides, extroversion had a weak significant indirect effect on the general use of smartphone and smartphone addiction. Extroverts used social media more often and had more Facebook friends, however their smartphone addiction levels were low. Horwood and Anglim (2018) wrote that although extroverts are more likely to perform online social behaviours, the positive personality components of extroversion may ease their tendency to be addicted.

In contrast, as shown by Lin et al. (2015), sociable individuals who utilise Internet, SMS and MIM have a higher tendency to develop smartphone addiction. Smartphone addiction was also associated with greater extroversion in individuals who preferred instant messaging and creating and maintaining social networks (Gutiérrez et al., 2016).

Furthermore, Ye, Toshimori, and Horita (2018) investigated the influence of personality traits in terms of shyness and sociability on smartphone addiction and loneliness. Firstly, it was proposed that social dependency might lead to smartphone addiction, in other words, sociability resulted in excessive use of instant messaging or email. Secondly, personality traits may also bring upon smartphone addiction. Individuals who are shy and sociable at the same time showed the strongest emotional reaction towards their self-perception in instant messaging or email dependency, which was significantly associated with smartphone addiction. They could build and maintain social relationships via instant messaging or email without face-to-face communication with others. In contrast, Darcin et al.

(2016) found that individuals with social anxiety may exhibit a higher risk of being addicted towards smartphone due to the opportunity to avoid face-to-face interactions and ease the pressure of communicating with others. In this sense, there are inconsistencies in studies about the mediating effect of smartphone usage in the relationship between extroversion and smartphone addiction. Both extroverts and introverts may have chances to be addicted towards smartphones, depending on their preferences in utilising the smartphone functions.

An in-depth understanding on personality traits, namely extroversion, can explain a part of the variation in the behaviours showing addiction towards smartphone usage. Other related information about the personality characteristics of individuals, such as the predisposition to seek for certain gratifications should be involved to predict and explain the relationship between personality traits and smartphone addiction.

According to a study by Jaalouk and Boumosleh (2018), undergraduate students from Notre Dame University were recruited to test few predictive factors and their effects on smartphone addiction. They reported that the reasons to use smartphone, from the highest to the lowest frequency, were listed as texting, entertainment purpose or calling family members, calling friends, academic purpose, news reading and other reasons. The multiple linear regression analysis showed that the higher score for smartphone addiction was significantly related with personality type A, not calling family members, and using smartphone for entertainment. The results showed the associations among personality traits, smartphone usage and smartphone addiction.

In particular, smartphone usage can indicate personality traits. According to the hypothetical example by Chittaranjan et al. (2011), smartphone users' personality may determine the predisposition to use certain smartphone functions. The behaviours of using those functions may be an indicator of individuals' personality. Montag et al. (2014) wrote

that smartphone usage hardly changes personality traits. This may indicate that personality predisposes individuals to perform certain behaviours, but not the opposite way around.

Cohn (2016) claimed that individuals of loner narratives identified themselves as introverted or shy and viewed the information technology and communication technologies as a mean to promote their natural tendencies, such as preventing the face-to-face interactions. They preferred texting compared with calling since it was more comfortable to communicate with those they were not closed enough. Besides, students can strengthen social life through smartphones, if they desire to do so. Through smartphones, their social needs are being met (Saha & Saha, 2018). In particular, individuals with issues in social communication would choose smartphones instead of face-to-face communication as this lessens their anxiety, and thus more vulnerable to develop smartphone addiction (Darcin et al., 2016). These showed that individuals have personal preferences in choosing which smartphone functions to be used as a mean to satisfy the needs or escape from the negative consequences which are too overwhelming for them. Functionalist perspective and Uses and Gratifications Theory (UGT) is applied to explain these phenomena.

Theoretical Framework

Smartphone usage may play a role as a mediator to describe and explain the inconsistencies of outcomes between personality traits and smartphone addiction. As the UGT suggests, technology users are not passive users, instead they actively explore media experiences to meet specific needs (Hiniker, Patel, Kohno, & Kientz, 2016). UGT addressed intrinsic factors of users (Joo & Sang, 2013). The intrinsic factors may include personality traits, whereby individuals display different motivations to satisfy their needs respectively. Studies were done to understand motives for and gratifications of smartphone usage (Elhai et

al., 2017b; Lee & Lee, 2017; North, Johnston, & Ophoff, 2014). The differences in needs and preferences may lead to different usage of smartphone functions, which act as mediator in the association between personality and smartphone addiction.

According to the study done by Gerlich, Drumheller, Babb, and De'Armond (2015), applications are multi-modal, in other words, each of them offers several features at once. They provide users with a more dynamic experience instead of a static and unidirectional function, whereby mobile application use motivations including news, entertainment, gaming, social media and other application usage can take place simultaneously to generate experience differs from other media.

In addition, Hiniker et al. (2016) found that individuals seeking ritualistic gratifications were more inclined to use social media, play games and browse news. On the other hand, individuals seeking instrumental gratifications preferred using utilities, searching savings opportunities, directions and maps, monitoring their health conditions, or connecting with others. From these studies, it may seem that various functions are carried out according to the types of motives or gratifications seek by individuals, which can be described in terms of types of smartphone usage based on UGT. The differences in tendency to seek for gratifications may vary due to individual traits, such as personality, which is associated with the predisposition to develop smartphone addiction. Therefore, it is crucial to test the relationship between personality traits and smartphone addiction, with smartphone usage as the mediator.

Based on the literature review mentioned above, UGT is suitable to be used in this study to explain the reasons behind the development of smartphone addiction in certain people. The different functions offered by smartphones combine with the multi-useful applications in the market perhaps able to satisfy and meet the needs of the user. This theory

proposes that smartphone addiction behaviours in individuals may differ according to the choice of smartphone functions that contributes to their actions. According to AlBarashdi (2015), UGT considers smartphone user as an active audience and stresses what people do with the smartphone and why people adopt this usage of smartphone functions.

There are six major types of gratification that had been identified among Sultan Qaboos university students, namely freedom and privacy, social communication, gossipping and self-expression, entertainment as well as knowledge seeking, sense of security and development of self, and finally as a symbol of conformity towards friends combined with a sense of self-identity (AlBarashdi, 2015). Perhaps some of these gratifications are being manifested by UTAR students, making rooms for this theory to be tested among UTAR Kampar students.

Functionalist perspective can also be used to support UGT and understand the motivation to use smartphones. According to Zhang, Chen, and Lee (2014), the usage of smartphone is also relevant to fulfill the unmet needs of the smartphone user. This study found that perceived enjoyment, past times, mood regulation and conformity affected smartphone addiction. According to Chen et al. (2017b), in order to fulfill the unmet need, a person will tend to repeat the behaviour again and again until the need is satisfied. This repetitive action will lead to addictive behaviour. In this study, two types of smartphone usage, which are the process and social usage will be tested to identify its mediating effect in the relationship between extroversion and smartphone addiction.

Conceptual Framework

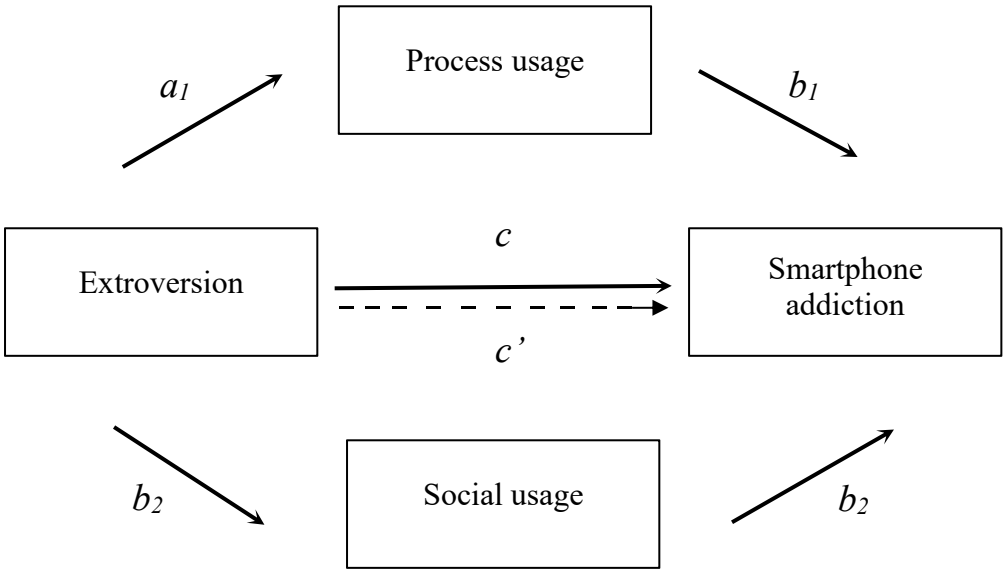

Figure 1. Conceptual framework model (total effect, $c = a_i b_i + c'$, c' = direct effect, $a_i b_i$ = indirect effect).

Based on the past researches mentioned above, a conceptual framework model is proposed and illustrated, as shown in Figure 1, regarding the relationship between personality traits in terms of extroversion and smartphone addiction. In this framework, extroversion is the predictor variable while smartphone addiction is the outcome variable. The smartphone usage plays a role as the mediator variable. From the literature review, it is suggested that extroversion may affect smartphone addiction. Personality traits will also influence behaviours, namely the purpose individuals use their smartphones for. This is because individuals can choose particular smartphone usage in order to satisfy their needs in accordance with their personality traits. At the same time, smartphone usage may affect the tendency to develop smartphone addiction as well. Thus, this study will investigate whether extroversion and smartphone addiction are being mediated by smartphone usage.

Chapter III

Methodology

Research Design/Framework

This study is a quantitative research which uses questionnaire (paper-and-pencil survey and online survey) as a mean to collect data. Cross-sectional survey method can be used in population-based survey. It is useful for this study as the risk factors and outcomes of participants were measured at the same time, rendering the opportunity to investigate the association between these variables, namely the extroversion trait, purpose of smartphone usage and smartphone addiction. It is a fast and inexpensive form of research which provides information regarding the prevalence of smartphone addiction among Universiti Tunku Abdul Rahman (UTAR) undergraduate students population (Setia, 2016). This suits the time frame allocated for Final Year Project which allows only a few months to complete it. Relevant information could be collected from a large group of students in the particular time frame. Besides, as students, the budget is low, and thus this research design is suitable to be used and enables data collection within large number of participants.

Sampling Techniques

Sample Size. UTAR Kampar Campus had roughly 15,000 students. The required sample size was calculated using Soper's (2018) Sample Size Calculator for Multiple Regression with the anticipated effect size, f^2=0.15, statistical power level of 0.8 and probability level of 0.05. The number of predictors was inserted as three, namely the extroversion, process usage and social usage of smartphone. Therefore, the minimum sample size required was 76. However, the raw data might have some issues, for instance missing data, incomplete or incompatible demographic information of research participants (in this

case was foundation or postgraduate students), therefore an extra amount of data would be collected. Eventually, we managed to collect data from 318 participants. Certain responses were eliminated due to incomplete answers (missing data of the whole section) by 4 participants (1.26%) and incompatible demographic information of participants, namely 5 foundation students (1.57%) and 1 postgraduate student (0.31%). In the end, we retained and used 308 responses.

Participants. 318 participants from UTAR Kampar Campus were recruited as participants. After data screening, the total valid sample was 308. The sample consisted of a total of 152 males (49.4%) and 156 females (50.6%) (see Table 1). The age range of the participants is between 18 years old and 26 years old. Three participants (1.0%) chose not to disclose their age. Besides, most of the participants are Chinese (82.1%), followed by Indian (12.0%), other races (2.9%) and Malay (2.3%). Two participants (0.6%) did not disclose their ethnicity group (see Table 1).

In addition, most of the participants are studying in Year 1 (40.5%), followed by Year 3 students (39.2%), Year 2 students (18.2%) and lastly Year 4 students (1.5%). One participant (0.3%) left the question blank (see Table 2). The faculties which the participants belong to, from the highest to the lowest proportion are Faculty of Arts and Social Science (FAS) (43.5%), Faculty of Business and Finance (FBF) (41.6%), Faculty of Information and Communication Technology (FICT) (6.8%), Faculty of Science (FSC) (5.2%), Faculty of Engineering and Green Technology (FEGT) (1.9%) and Institute of Chinese Studies (ICS) (1.0%) (see Table 2). Lastly, all participants claimed that they have smartphone.

Sampling method. Non-probability sampling reflects the acquisition of participants based on researchers' judgment. It is important when randomisation cannot be done due to the large population, with UTAR Kampar Campus as an example. Purposive sampling was used in selecting the sample to be studied according to the participants' characteristics or possessed qualities which could facilitate this study (Etikan, Musa, & Alkassim, 2016), whereby university students are plenty in UTAR Kampar Campus and they generally use smartphones. These suit the participants' inclusion criteria for this study regarding the link between personality trait, smartphone usage and smartphone addiction among undergraduate students, which are relevant to answer the research questions.

Besides, another non-probability sampling method, namely quota sampling was used in selecting approximately equal number for both genders. Data was collected from the stratums to fulfil the required quota which were representative of the particular population (Saunders, Lewis, & Thornhill, 2012). Therefore, the sample was selected from each stratum based on a specific proportion, for instance gender in this study. Similar proportion of males and females were required to ensure that the results are representative in terms of gender.

Research Location. The study was conducted at UTAR Kampar Campus in Perak, an education hub with large student population of more than 10,000 students (EasyUni, 2018). The students come from hometowns in different parts of Malaysia, making it possible to access samples from different states at a location. As the university students are the target population for this study, and many young adults who are currently furthering their studies in UTAR Kampar usually use smartphones in their daily lives, they may provide relevant information related to the study of relationship between personality traits and smartphone addiction, which is mediated by the purpose of smartphone usage.

Research Procedures

Data was collected at Week 2 of the semester which begins on October 2018. Data collection commenced for about a week, starting from 22th of October to 28th of October. The participants were chosen based on purposive sampling method to target samples with smartphone while quota sampling method was used to select an approximately proportional number of male and female students. Data was collected from every six faculties available in UTAR Kampar Campus, which are FAS, FICT, FBF, FSC, ICS and FEGT. The participants were recruited from various locations, such as the pathways in Block P, Block N, Block H, Block E, outside IDK lecture halls, library as well as cafeteria in Block K.

The participants who were waiting for classes or chatting with friends were approached and asked to join the paper-and-pencil questionnaire survey voluntarily. They were required to fill in the consent form, demographic data and answer three sections of questionnaires, namely the extraction of extroversion-introversion trait from the International Personality Item Pool-Five Factor Model-50 scale (IPIP-5-50), Process and Social Usage Scale and Smartphone Addiction Inventory (SPAI) scale. The consent form was signed by the participants as a sign of agreement to participate after they had read the purpose and objectives of the study, as well as the information regarding confidentiality procedures. The right to withdraw from the study without any consequences was listed along with the information of the study mentioned previously. The questionnaire would take about 15 to 20 minutes to complete every sections. Throughout the process, participants could raise enquiries regarding this study and the items used. The researchers would then answer their questions to clarify any doubts. Questionnaires were collected from the participants after they had finished answering and token of appreciation (a pack of snacks) were given to appreciate their efforts.

In addition, online survey via Google Forms was conducted to collect data from the sample. The reason to use online survey was the insufficient amount of male participants. There was a gap of unequal number of female and male participants collected via the paper-and-pencil survey method. Thus, as a way to narrow the gap, Google Forms was used to target and collect responses from male participants. The questionnaires, with the same components as the paper-and-pencil survey, were uploaded on Google Forms. The link was shared via Facebook personal messages or WhatsApp to reach personal friends who are UTAR Kampar Campus students. This facilitated completion of questionnaires as they could answer them regardless of location and time.

Once data collection was completed, another two weeks were used to run the analysis using the Statistical Package for Social Science (SPSS) statistical software 23th version and for finishing the documentation of results.

Data Analysis Plan

Data analysis was done as soon as data was finished being collected. The data was inserted into SPSS to run the analysis for questionnaires reliability, data screening, including outliers determination and assumption checking, descriptive statistic, such as the mean and standard deviation to examine demographic information and total scores from IPIP-5-50, Process and Social Usage Scale and SPAI. In terms of inferential statistics, *Pearson Correlation* was performed to examine the correlation between the variables to answer the first, second and third research questions. Finally, regarding the mediation effect, Hayes's PROCESS SPSS macro analysis was performed to provide answer to the last research question to examine the direct and indirect pathways through which extroversion may affect

smartphone addiction via the smartphone usage. In addition, significance level for the findings was fixed to be less or equal to 0.05.

Instruments/Questionnaires

Three instruments were used in this study to predict whether the purpose of smartphone usage can serve as a mediator between extroversion and smartphone addiction. These three instruments measure the level of extroversion of the participants, their personal usage preference towards their smartphone as well as their level of smartphone addiction. Six questions were also created to collect demographic information of participants.

Demographic information. Demographic information of participants were obtained by asking an open-ended question (age) and five close-ended questions in the first section of the questionnaire. Firstly, they wrote down their age. The subsequent questions included ticking the answers for gender, ethnicity, year and trimester of study, faculty as well as possession of smartphone(s). Answers which were not available in the options were written by the participants in the line provided. Besides, some participants left the answer blank when they chose not to disclose certain demographic information.

International Personality Item Pool-Five Factor Model-50 (IPIP-5-50). This scale was developed by Goldberg (1992) using International Personality Item Pool. There are five subscales, which are openness, conscientiousness, extroversion, agreeableness and neuroticism. Each of the subscale contains 10 items and is measured using 5-point Likert scale (“1=very inaccurate”, “2=moderately inaccurate”, “3=neither accurate nor inaccurate”,

"4=moderately accurate", and "5=very accurate"). There are negatively keyed items whereby five items shall be reversed score ("Converting IPIP item responses to scale scores," n.d.). Only 10 items from extroversion subscale were chosen to be used because only extroversion was tested for this study. The total sum of 10 items for each subscale shall range from 10 to 50. The higher the score, the higher the individuals' extroversion level. The Cronbach's Alpha from previous research was 0.87 for extroversion subscale ("Characteristics of the preliminary IPIP scales measuring the Big-Five domains," n.d.). Besides, it showed a cross-cultural concurrent validation, especially in the Chinese context in Asia, whereby the 50-item and 100-item versions of IPIP were strongly correlated with the Big Five Inventory (Zheng et al., 2008). Reliability analysis in this study showed that the Cronbach's Alpha was 0.82, which was good as it was above 0.70.

Process and Social Usage Scale. This scale was developed by Van Deursen et al. (2015). This scale consists of 12 items in which seven of it measure the process usage while the rest of the five items measure the social usage of the participants. The items are assessed using 5-point Likert scale ("1=strongly disagree", "2=disagree", "3=neither agree nor disagree", "4=agree", and "5=strongly agree"). The final score is obtained through the summation of process and social usage respectively. The higher the score for particular smartphone usage, the higher the tendency for individuals to perform certain smartphone usage behaviours, namely the process or social usage of smartphone. It shall be noted that one can have the preferences for both purpose of smartphone usage. The process and social usage recorded Cronbach's Alpha of 0.89 and 0.73 respectively (Van Deursen et al., 2015). Cronbach's Alpha for Process and Social Usage Scale in this study was calculated after data was obtained and the value was also satisfactory at 0.81. In particular, the process and social usage had Cronbach's Alpha of 0.73 and 0.81 respectively.

Smartphone Addiction Inventory (SPAI) scale. This is a scale developed by Lin et al. (2014). This scale consists of 26 items comprising of four different subscales, which are compulsive behaviour, functional impairment, withdrawal and tolerance to smartphone. The items are measured using 4-point Likert scale (‘‘1=strongly disagree’’, “2=somewhat disagree”, “3=somewhat agree”, and “4=strongly agree”). The total sum of all items will be calculated to obtain the final score. The final score will range from 26 to 104 (Matar Boumosleh & Jaalouk, 2017). The higher the score, the higher the individuals’ level of smartphone addiction. The Cronbach’s Alpha was 0.94 whereas the test-retest reliability of the total scores and the subscales ranged from 0.80 to 0.91. Furthermore, Matar Boumosleh and Jaalouk (2017) wrote that SPAI had been used and validated among university students. The factor analysis in terms of Kaiser-Meyer-Olkin overall sampling adequacy test reported 0.93, indicating the validity of sample in measuring smartphone addiction (Lin et al., 2014). Cronbach’s Alpha in this study was 0.92.

Chapter IV

Results

Descriptive Statistics

Participants' demographic information were listed using the total number of participants and percentage, whereas scores for respective instruments were recorded in terms of mean and standard deviation.

Table 1

Descriptive Statistics for Participants' Gender and Ethnicity

Gender	*n*	%	Ethnicity	*n*	%
Male	152	49.4	Chinese	253	82.1
Female	156	50.6	Malay	7	2.3
			Indian	37	12.0
			Others	9	2.9
			Missing	2	0.6

Note. *n* = number of participants, % = percentage of participants.

Table 2

Descriptive Statistics for Participants' Year of Study and Faculty

Year of Study	*n*	%	Faculty	*n*	%
1	125	40.5	FAS	134	43.5
2	56	18.2	FBF	128	41.6
3	121	39.2	FEGT	6	1.9
4	5	1.5	FICT	21	6.8
Missing	1	0.3	FSC	16	5.2
			ICS	3	1.0

Note. *n* = number of participants, % = percentage of participants.

Table 1 and Table 2 indicated that 308 participants were selected from UTAR Kampar Campus. The response rate for gender and faculty were 100.0% whereas the response rate was 99.4% for ethnicity and 99.7% for year of study. In this study, the numbers of male and female were to be approximately distributed according to the predetermined value, whereby male and female were recorded as 49.4% and 50.6% respectively. Other descriptions of demographic information can be found in the methodology chapter.

Table 3

Descriptive Statistics for Summed Scores of Instruments

Variable	*M*	*SD*
IPIP-5-50 (Extroversion)	30.03	6.58
Process Usage	25.73	4.03
Social Usage	20.35	3.33
SPAI	60.28	12.83

Note. M = mean, *SD* = standard deviation, IPIP-5-50 (Extroversion) = International Personality Item Pool-Five Factor Model-50, SPAI = Smartphone Addiction Inventory Scale.

In terms of purpose for smartphone usage, the result (see Table 3) showed that more oftenly participants used smartphone for process usage ($M = 25.73$, $SD = 4.03$) than social usage ($M = 20.35$, $SD = 3.33$).

Inferential Statistics

RQ1: The correlation between personality traits and smartphone usage (*a pathway*)

H_1: There is a significant negative relationship between extroversion and process usage.

Table 4 showed the results of relationship between extroversion level and two types of smartphone usage, which are process usage and social usage. From this study, the finding of *Pearson's Correlation* indicated that there is a significant negative correlation between

extroversion and process usage of smartphone among UTAR undergraduate students, r (306) = -.120, p = .036. Therefore, the result obtained from this study matched the alternative hypothesis and failed to be rejected. Thus, the more extrovert a person is, which is indicated by the higher score of extroversion trait, the lower the process usage level of smartphone. On the other hand, the result also supported that there is no significant relationship between extroversion and social usage of smartphone, r (306) = .101, p = .077. This result indicated that social usage is no longer valid as a mediator between extroversion and smartphone addiction.

Table 4

Result of Pearson's Correlation between Extroversion and Smartphone Usage

			Extroversion
Smartphone Usage	**Process Usage**	Pearson's Correlation	-.120*
		Sig. (2 tailed)	.036
		n	308
	Social Usage	Pearson's Correlation	.101
		Sig. (2 tailed)	.077
		n	308

Note. * $p < .05$, n = number of participants.

RQ2: The correlation between smartphone usage and smartphone addiction (*b pathway*)

H_1: There is a significant positive relationship between process usage and smartphone addiction.

Table 5 showed the result of *Pearson's Correlation* between the mediator, which is smartphone usage and the outcome variable, namely smartphone addiction. From the table, we can conclude that process usage is positively correlated to smartphone addiction, r (306) = .299, $p < .001$. This implies that the level of smartphone addiction increases with the level of process usage. Process usage includes using smartphone for purposes such as entertainment and playing games. On contrary, the social usage of smartphone is not significantly related to smartphone addiction, r (306) = .030, p = .594. Social usage such as texting and calling to connect with others does not relate to smartphone addiction. Thus, it is concluded that the null hypothesis is rejected and process usage, but not social process, is related to smartphone addiction.

Table 5

Result of Pearson's Correlation between Smartphone Usage and Smartphone Addiction

			Smartphone Addiction
Smartphone Usage	**Process Usage**	Pearson's Correlation	.299**
		Sig. (2 tailed)	.000
		n	308
	Social Usage	Pearson's Correlation	.030
		Sig. (2 tailed)	.594
		n	308

Note. ** $p < .01$, n = number of participants.

RQ3: The correlation between extroversion and smartphone addiction (*c pathway*)

H_1: There is a significant positive relationship between extroversion and smartphone addiction.

Table 6 showed the result of *Pearson's Correlation* between the predictor, extroversion and smartphone addiction, which is the outcome variable. It was found that extroversion does not have a significant positive correlation with smartphone addiction, r (306) = .010, p = .861. Thus, the null hypothesis is not rejected and that both predictor and outcome variable are not correlated.

Table 6

Result of Pearson's Correlation between Extoversion and Smartphone Addiction

		Smartphone Addiction
Extroversion	Pearson's Correlation	.010
	Sig. (2 tailed)	.861
	n	308

Note. n = number of participants.

In summary, Table 7 summarised the correlation between all the variables involved in this study. Surprisingly, both smartphone usages that were measured in this study, namely the process usage and social usage are also positively correlated to each other, r (306) = .390, p < .001. From this study, it is found that extroversion is negatively correlated to process usage. On the other hand, social usage is not significantly correlated to both extroversion and smartphone addiction. Hence, process usage can be used for mediation analysis, which is one of the main aims of this study, but it does not apply to social usage.

Table 7

Summary of Pearson's Correlation between Extroversion, Smartphone Usage and Smartphone Addiction

	M	***SD***	**1**	**2**	**3**	**4**
1. Extroversion	30.03	6.58	-	-.120*	.101	.010
2. Process Usage	25.73	4.03	-.120*	-	.390**	.299**
3. Social Usage	20.35	3.33	.101**	.390**	-	.030
4. Smartphone Addiction	60.28	12.83	.010	.299**	.030	-

Note. * p < .05, ** p < .01, M = mean, SD = standard deviation, 1 = Extroversion, 2 = Process Usage, 3 = Social Usage, 4= Smartphone Addiction.

RQ4: Mediation Analysis

Hayes's PROCESS SPSS macro was used to test the mediating role of purpose of smartphone usage in the relationship between extroversion and smartphone addiction.

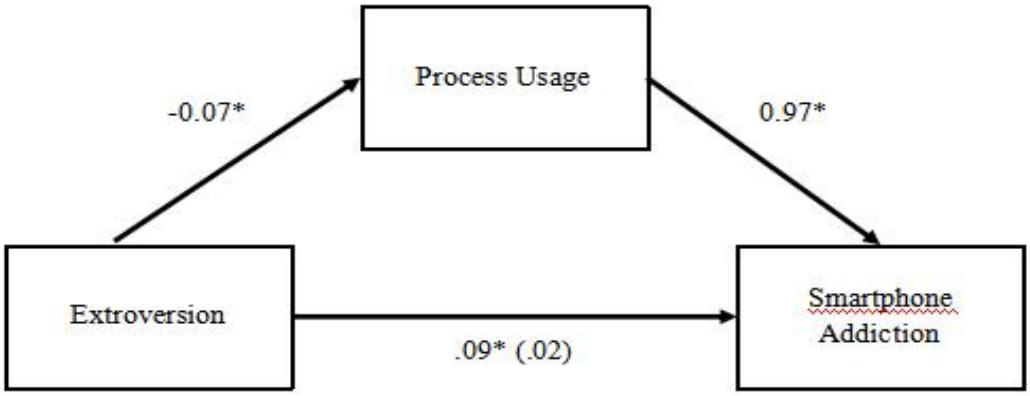

Figure 2. Mediation model showing effects of process usage on the relationship between extroversion level and smartphone addiction. Values shown are standardized coefficients. The total effect of extroversion to smartphone addiction was shown in parenthesis. * $p < .05$.

Mediation analysis on process usage (see Figure 2) of smartphone revealed that the indirect effect of extroversion on smartphone addiction via process usage of smartphone is significant, $B = -.07$, $SE = .04$, 95% CI [-.16, -.01]. As zero is not included in the confidence interval (CI), mediation is present (Morera & Castro, 2013). By controlling for the effect of process usage of smartphone, the direct effect of extroversion on smartphone addiction is not significant ($B = .09$, $SE = .11$, $t = .85$, $p = .40$). Furthermore, the relationship between extroversion and smartphone addiction (total effect or *c pathway*) is not significant ($B = .02$, $SE = .11$, $t = .18$, $p = .86$). Therefore, a complete mediation is found in the relationship between extroversion and smartphone addiction via process usage of smartphone as the mediator variable. In other words, individuals with a higher level of extroversion may

perform lesser process usage (negative correlation), and this leads to a lower level of smartphone addiction (positive correlation).

On the other hand, mediation analysis done on social usage (see Figure 3) of smartphone found that the indirect effect pathway is not significant, showing B = .01, SE = .01, 95% CI [-.01, .05]. The indirect effect is not significant as the CI consisted of zero (Morera & Castro, 2013). The direct effect of extroversion on smartphone addiction while controlling for the effect of social usage of smartphone is also not significant (B = .01, SE = .11, t = .12, p = .90). As the indirect effect is not significant, the requirement to claim social usage of smartphone as mediator in the relationship between extroversion and smartphone addiction is not being fulfilled.

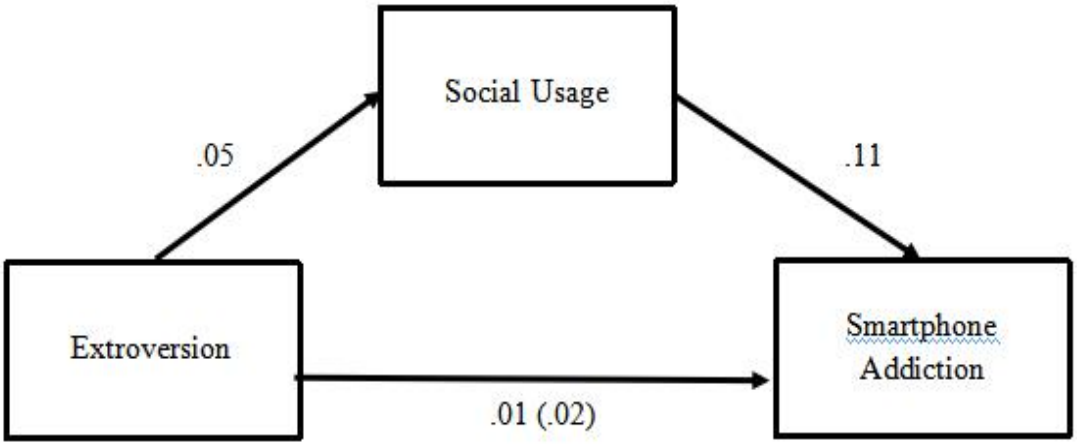

Figure 3. Mediation model showing effects of social usage on the relationship between extroversion level and smartphone addiction. Values shown are standardized coefficients. The total effect of extroversion to smartphone addiction was shown in parenthesis. This mediation pathway is not significant.

Regarding the causal steps approach with specific conditions to be fulfilled throughout the analysis of mediation, one of them is to stop further analysis if the *c pathway*

is not significant (Morera & Castro, 2013). However, concerns have been raised on the overemphasising of the significance between the independent and dependent variables in the mediation analysis (Rucker, Preacher, Tormala, & Petty, 2011). Zhao, Lynch Jr., and Chen (2010) claimed that the strength of mediation should be based on the indirect effect size instead of the presence or absence of direct effect. Therefore, the only one requirement suggested to claim mediation was a significant indirect effect. Besides, a significant indirect effect can exist despite the absence of total effect or direct effect (Rucker et al., 2011; Zhao et al., 2010). Hence, our result found a complete mediation in the association between extroversion and smartphone addiction via the process usage of smartphone, with significant indirect effect, but insignificant direct effect. On the other hand, social usage of smartphone did not act as a mediator as the indirect effect was insignificant in the relationship between extroversion and smartphone addiction.

Chapter V

Discussion & Conclusion

This study had used *Pearson's Correlation* and mediation analysis to test the role of smartphone usage as mediator in the relationship between personality trait (extroversion) and smartphone addiction. Before starting the discussion, bear in mind that an individual may use both process function and social function of smartphone. However, the Process and Social Usage Scale that was used in this study is not intended to categorise the individual and is only useful to indicate to what extent both functions are applied by an individual in daily life.

RQ1: The correlation between Extroversion and Smartphone Usage

This study had supported the first hypothesis that there is a negative correlation between extroversion and process usage of smartphone. This result implies that the more extrovert a person is, he or she will be using less process features of a smartphone. This also indicates that the more introvert a person is (as shown by a lower level of extroversion in a person), he or she will be using more process features of a smartphone. Unfortunately, most past researches revealed that extroversion was highly related to social usage as extroverts are naturally outgoing and socialised person (Chittaranjan et al., 2011; Lane & Manner, 2011). Surprisingly, our study did not discover any significant relationship between extroversion and social usage. The outcome of this study is partially similar to a study conducted by Kim et al. (2015) who discovered that the more extrovert a person is, he or she would use lesser literacy application (which is similar to the process features being tested in this study) and more relational application. However, other process features such as e-commerce, information application and entertainment were not related to extroversion (Kim et al., 2015).

Our unique finding may be explained by a study on the relationship between smartphone application personality and smartphone users' personalities and social capital (Tan, Hsiao, Tseng, & Chan, 2018). It stated that currently, traditional communication application (voice call and SMS) were no longer preferred compared to instant messaging and social media. The study also showed that entertainment applications were vital in perceiving social capital as entertainment applications now were able to bridge and bond people together (Tan et al., 2018). This can be seen from nowadays entertainment applications, including music streaming applications such as Spotify, social media applications like Instagram and even online games like Mobile Legend. All these applications provided an interactive channel through the mean of chat room or private message in order for their users to interact with one another. This may be the reason for extroverts to not focus much on social features as they can still interact with others through process feature applications.

A review done by Bolle (2015) also supported this finding by revealing that the characteristics of people with higher tendency to be addicted to smartphone were younger individuals, those who had higher social stress, had low self-regulation and used more smartphone to obtain process gratification. Bolle (2015) defined introverts as the ones who experienced higher social stress compared to extroverts and used digital communication as an alternative to obtain a 'safe environment' to socialise. Thanks to the current shift in trend, it was possible to say that introverts who experienced social stress prefered to socialise digitally with other people through the new means of process features of smartphone while performing other activities with their smartphones, such as playing games. This action was considered trendy than using smartphone only for its social features.

In summary, both shift in trend of smartphone and introverts' tendency to be addicted to smartphone make it realistic enough to conclude that lower extroversion level correlated to more process usage among users.

RQ2: The Correlation between Smartphone Usage and Smartphone Addiction

Process and social usage are two types of smartphone usage that had been tested in this study. Although both types of smartphone usage have tendency to be related to smartphone addiction, it must depend on the users' smartphone behaviours. After conducting this study, the null hypothesis is rejected. Process but not social usage is positively correlated to smartphone addiction. This result indicated that the higher the level of process usage in a user, the higher the level of smartphone addiction and vice versa. This result matched with previous literatures which mostly claimed that process usage was positively related to smartphone addiction (Bae, 2017; Elhai et al., 2017a, 2017b; Matar Boumosleh & Jaalouk, 2017).

As suggested by Van Deursen et al. (2015), smartphone addiction occurred as a consequence of habitual smartphone usage. Habitual indicated frequent usage. Frequent use of smartphone might occur due to internal (example: boring) and external (example: conformity) factors as well as automatic urges like simply checking any incoming notifications (Van Deursen et al., 2015). Surprisingly, the researchers claimed that process usage, which was a strong determinant of smartphone addiction, ensured the addictive behaviour continuously being repeated through positive reinforcement. This might be the potential explanation as smartphone users usually received pleasurable experiences like satisfaction and victory through process features, for instance listening to pleasant music, watching funny videos and even winning their favorite smartphone games. Similarly, this

explanation was also applicable to the instant gratification that smartphone users received when using smartphone, as proposed by UGT theory (Zhang, Chen, Zhou, & Lee, 2014).

In addition, according to Roberts, Yaya, and Manolis (2014), negative reinforcement could also be experienced by smartphone users, thereby leading to repetitive use which eventually might lead to smartphone addiction. Negative reinforcement occurred through activities like pretending to take call or typing messages to avoid social situation (Roberts et al., 2014). This was similar to a case happened to A, who used smartphone as a negative reinforcer to deal with relationships problem but eventually, became more addicted to smartphone due to the process features of smartphone in which she used it as a tool to manage everything in life but not for phone calls (Körmendi, Brutóczki, Végh, & Székely, 2016).

Research done by Zhang et al. (2014) had revealed that apart from instant gratification, mood regulation also influenced smartphone addiction. This is supported by the experimental study conducted by Panova and Lleras (2016), who proposed a possible mechanism to explain negative relationship between mental status and technology usage (eg: smartphone). They claimed that individuals were less likely to react to stressful situations when they turned to technology to cope with the problematic situations. Although this was similar to negative reinforcement, but the fact was undeniable that some individuals sought for emotional buffering through technology had helped them to calm their anger, sadness and frustration via process features of smartphone, such as entertainment. In return, this action ensured control over their own emotion and mood to remain calm and face through the day.

On the other hand, it is also possible to use social features as calming tools. However, bear in mind that not everyone (including extroverts) wants to call or simply texts anyone to let out their anger and frustration. As a matter of fact, expressing emotions through digital

communication is definitely not an effective tool as it can lead to miscommunication and misinterpretation by the other person due to the absence of other body language and cues from facial expressions.

In contrast to our finding, Van Deursen et al. (2015) claimed that social features could indirectly lead to smartphone addiction through reinforcement. Our finding did not reveal the same result, this might due to social usage only led to smartphone habit, but not smartphone addiction (Bolle, 2015). The Smartphone Addiction Inventory Scale was intended to measure only smartphone addiction, not smartphone repetitive habit. Thus, this may explain the reason behind the insignificant correlation between social usage and smartphone addiction. However, since Van Deursen et al. (2015) mentioned that social usage might have indirect effect on smartphone usage, it was tested in mediation analysis and found that there is no occurence of mediation effect.

Thus, positive and negative reinforcement as well as mood regulation may be some of the factors to explain our finding that process usage is positively correlated to smartphone addiction.

RQ3: The Correlation between Extroversion and Smartphone Addiction

Surprisingly, our finding revealed that there is no correlation between extroversion and smartphone addiction and the null hypothesis is not rejected. This result indicated that extroverts may not necessarily have smartphone addiction. This result is different from what had been found by past researchers as majority of them claimed that extroversion is positively related to smartphone addiction (Biglu & Ghavami, 2016; Hong et al., 2012; Panda & Jain, 2018; Takao, 2014).

Eventually, some past studies do support our finding (Horwood & Anglim, 2018; Hussain et al., 2017; Pearson & Hussain, 2016). Although possibility of biased answers by the research participants who underestimated their own smartphone usage had occurred (Hussain et al., 2017), it might not be the sole reason. According to Horwood and Anglim (2018), attribution should be given to the change in smartphone functions from merely connecting people to multi-function purposes, for instance internet-based activities, which later influenced these extroverts to engage in other process-based interesting activities like playing games and listening to music instead of just for social purposes to connect with people. According to a poll done among 2000 British smartphone users ("Revealed," 2017), it was found that making phone calls no longer ranked among the top ten functions used by the users. In contrast, 7 out of the 10 functions were mostly process functions, including the use of e-mail, camera, reading news, online shopping, checking weather, banking and 'Youtube'ing.

Furthermore, as proposed earlier (in RQ1), these features previously are mainly for process usage, at the same time, they offer opportunities to remain connected with others through interactive chat box or private message which are available in the applications or the smartphone itself for the users' convenience. Thus, extroverts no longer need to rely on only smartphones' basic functions like calling and texting to socialise. Their natural traits that are outgoing, cheerful and easy-going contribute to additional resources that enable them to easily adapt in social situations and thus less need for mediated social interaction through smartphones. This is supported by Whalen (2015) who revealed that extroverts prefer to communicate through face-to-face interaction to express themselves more accurately in comparison to introverts.

In sum, the shift in functional trend of smartphone, the advanced process features of smartphone that enable people to stay connected just like social features and extroverts' own

preferences for direct social interaction support the result that extroversion is not correlated to smartphone addiction.

RQ4: Mediating Role of Smartphone Usage

The relationship between extroversion and smartphone addiction is well documented in the literature, but little is known about the underlying mechanism of this relationship. The findings for hypothesis four showed that process usage of smartphone completely mediates the relationship between extroversion and smartphone addiction. In other words, the lower the level of extroversion, individuals are more likely to be involved in process usage of smartphone, and thus increases their smartphone addiction level. Besides, social usage of smartphone did not act as a mediator in the relationship between extroversion and smartphone addiction.

The purpose of smartphone usage, namely the process usage and social usage of smartphone may act as a mediator of influence on smartphone addiction. For instance, the findings may be supported by related studies by researchers, such as Elhai et al. (2017a) who found that the process usage of smartphone acted as a mediator in between the relation of anxiety and smartphone addiction. It is claimed that individuals who are more anxious will incline to non-social smartphone usage due to social avoidance. The avoidance of social situations may be one of the characteristics of introverts (Eysenck & Eysenck, as cited in Sultan, 2014). This supported our results on mediation process which controlled for the effect of process usage in the relationship between extroversion and smartphone addiction, while showing a negative correlation between extroversion and process usage. In other words, the less extroverted an individual is, the higher the level of smartphone addiction via the pathway of process usage of smartphone.

However, not all socially anxious individuals are introverts. Extroverts may be anxious in certain social situations too (Mulder & van Aken, 2014). It shall be noted that personality trait is a continuum, whereby individuals can exhibit characteristics of extroversion and introversion, depending on their preferences and situations they are in. From these descriptions, it partially supported our result, specifically, despite being introverts or extroverts, individuals who are more socially anxious prefer process usage of smartphone with increased use, and probably being addicted to smartphone.

On the other hand, the results of social usage of smartphone as a mediator of influence on smartphone addiction were inconsistent among studies found. Kita and Luria (2018) investigated whether extroversion could predict the use of smartphone during driving in control for the effect of smartphone addiction, but the mediating relationship was not supported. It was speculated that the insignificant relationship between extroversion and smartphone addiction may be due to lack of desire for social interaction through smartphones. This explanation may be applicable in this paper whereby individuals who do not show the need to use smartphone for social purposes, regardless of them being introverts or extroverts, may not lead to smartphone addiction.

Another speculation regarding the non significant indirect effect of social usage of smartphone between extroversion and smartphone addiction may be due to the possibility of a different direction of causal relationship for social usage of smartphone and smartphone addiction. Hong et al. (2012) stated that smartphone addiction could predict smartphone usage, whereby female university students who developed smartphone addiction engaged more in calling others and sending text messages. The difference in the direction of causation may lead to the non significant effect of social usage as mediator.

However, Barnes, Pressey, and Scornavacca (2019) stated that the inability to self-regulate negative actions, such as being addicted to using smartphone for social purposes, specifically termed as cognitive absorption could predict smartphone addiction with addiction to SNS as the mediator. An individuals with good self-regulation skills had higher scores in extroversion (Dörrenbächer & Perels, 2016). It might be reasonable to assume that individuals who had lower extroversion scores exhibited a tendency to be addicted to using smartphone via social purposes due to the negative self-regulation skills. This differed from our findings whereby the indirect effect of social usage of smartphone as mediator was not significant.

Overall, individuals who are more introverted or socially anxious prefer process usage instead of interacting with others, and may subsequently develop a higher level of smartphone addiction. Besides, the lack of needs for social interaction and the opposite direction between social usage of smartphone and smartphone addiction may explain the non significance of social usage as the mediator in the relationship between extroversion and smartphone addiction.

Implications

This study fills the gap in literature whereby smartphone usage acts as the mediating variable between extroversion and smartphone addiction. Hopefully, this study can bring a change in how psychologists and public view smartphone addiction. Just like the findings obtained from this study, smartphone addiction stems from personality which further guides individuals' smartphone behaviours. Smartphone addiction is no longer merely involving a direct causal and effect pathway but rather it involves a series of complex interaction between a factor with another factor. Theories, for example UGT used in this study, describes the

personal characteristics of individuals and gratifications to satisfy their needs. They are predisposed to certain behaviours according to their needs. Most studies applied UGT to explain the association between personality traits and smartphone usage behaviours, overlooking the possibilities that smartphone usage could eventually lead to smartphone addiction. Speculations are made in this study to link smartphone usage behaviours to the predisposition of smartphone addiction. Therefore, instead of relying on theories like UGT which may not completely explain the mediating effects, perhaps a more comprehensive theory can be constructed from the indirect pathway and helps in explaining the complex interactions between factors that lead to smartphone addiction. A new modern theory shall explain smartphone addiction comprehensively in relation to this modern era.

Besides, the results from this study can give an insight to smartphone manufacturers and applications developers to create and improve smartphone functions so that there will be less dependency on smartphone and decreased the level of smartphone addiction. This can be done by taking into account personality traits of people and how smartphone usage is being affected. The smartphone functions can be tailored to suit specific characteristics of people, such as for introverts and extroverts. Nowadays, applications like Forest, Dinner Mode, Onward and Step Lock were invented and claimed to be able to cure smartphone addiction by certain features that prevent smartphone users from using their devices (O'Leary, 2017). Perhaps, based on this study, these applications can be improved with the creation of two versions of applications which target people with different personality traits. For example, since extroverts utilise less process usage and more social usage, the applications installed can restrict the time for them to engage in social features of smartphone in order for extroverts to monitor their smartphone usage behaviours.

The efforts by smartphone manufacturers and applications developers are in vain if the awareness and understanding of the relationships among extroversion, smartphone usage and smartphone addiction are not being exposed to public. From the findings, process usage significantly mediates the relationship between extroversion and smartphone addiction. Individuals who prefer process usage of smartphone shall be targeted as they are at high risks to develop smartphone addiction. Various parties, such as organisers of campaigns to curb smartphone addiction, counsellors in educational institutions and individuals themselves can take note on this and monitor the smartphone usage behaviours to prevent or formulate intervention plans to reduce the overwhelming usage of particular smartphone features.

In fact, future policies regarding smartphone usage, especially in public places, schools, and certain activities like driving must take into account the needs of individuals based on their personality. This is beneficial to help in ensuring the effectiveness of the policies. Previously, Malaysian Ministry of Education banned smartphone usage in school since 2012 (Abdullah, 2017). However, it received many objections from parties such as school authorities and teachers. The current Malaysian government is considering safety and facility as the key factors in allowing smartphone usage in school (Arif, 2018). Instead of solely focusing in these two factors, personality of students and their smartphone usage trends need to be investigated too. Therefore, the ministry may consider allowing smartphone usage in schools after deeply examining these additional factors to determine whether there is a need to create an application to enable school authorities to control students' smartphone usage based on information about their personalities and preferences. In other words, personality and own preferences are important aspects to control students' usage of smartphone and subsequently smartphone addiction.

Limitations of Study

Like all research studies, this study also comes with several flaws and limitations. All these limitations are addressed in order to assist other researchers in conducting better studies in the future.

Firstly, this study relied on purposive sampling which only focused on students from UTAR Kampar Campus. Due to time constraint and lack of resources, it is hard to obtain samples of UTAR students from Sungai Long Campus. In addition, purposive sampling has made us focused solely on university students instead of other age groups like children and teenagers who are also being affected by smartphone addiction. Therefore, generalisation of the results to all UTAR students including those from Sungai Long Campus, university students from other areas in Malaysia and other age groups population must be made with caution to prevent bias. Overgeneralisation must be strictly avoided.

The fact that this study involved the collection of self-reported data posed another limitation. As we know, data which were collected quantitatively through self-report can be hardly verified. Thus, researchers need to accept whatever answers given by the participants without any chances of rectifying or clarifying through other methods like interviews or experiments. In addition, the participants themselves may give biased answers. Some of them may have problems recalling their own smartphone behaviours since smartphones are being used rapidly and unconsciously. In fact, some participants may exaggerate or underestimate their own behaviours, thus reporting responses which are differed from the actual behaviours. Due to these reasons, the data collected may be biased in terms of accuracy.

Besides, this study is conducted using a cross-sectional design. Despite being relatively faster and inexpensive, the outcome (smartphone addiction) and the exposure (extroversion and smartphone usage) are measured only once throughout the entire study

(Setia, 2016). In this case, the data is collected in 2018. The trend in smartphone usage is rapidly evolving and the same result may not be obtained in the next few years. Thus, the results are valid for only a limited period of time towards one particular group of participants. Moreover, it is hard to make causal relationship from cross-sectional study (Setia, 2016). Although we managed to show the mechanism on how extroversion influences smartphone addiction through process usage of smartphone, the result must be viewed with caution and repeated using other research designs like longitudinal design to confirm the cause and effect relationship in a longer duration.

Recommendations

In the future study, it is crucial to take note on the characteristics of the targeted population, such as the proportion of gender, races, age group and other demographic variables. Instead of having many undergraduate students from FAS as participants, those from other faculties shall not be overlooked. Besides UTAR Kampar Campus, similar studies can be expanded to a larger geographical area of other universities or colleges in Malaysia. Similarly, participants from various races shall be included in the study as Malaysia is a multicultural and multi-ethnic country. The same goes for other characteristics of the population by considering the effects of age, socioeconomic status and other demographic variables. This is because individuals from various backgrounds may develop different perceptions on certain topic, such as smartphone addiction. Opinions and perceptions from individuals of various demographic characteristics are important to be included so that accurate and unique information can be obtained to enhance the external validity and reliability of study.

As self-report data relies on participants' subjective view about themselves and on certain topic, objective data shall be collected. For instance, information on the usage of smartphone and smartphone addiction can be acquired by monitoring the time spent and applications used through tracking applications installed for research purposes. Through this tracking applications, a more accurate data regarding the participants' pattern of usage may be recognised by the researchers. Besides, interviewing significant others about participants' personality may be helpful as they can observe the behaviours of the participants in everyday life. From the descriptions and examples provided, it may be possible to better understand the participants' level of extroversion. These both methods of collecting information may compensate the limitations of only utilising self-report through the obtainment of objective measurements. Hence, future research using objective measurements or quantitative study, for example interview is worth studied.

Lastly, instead of reviewing the trends using results from cross-sectional design, the outcome and exposure measures can be done in a long term run, for instance longitudinal research design. The changes in behaviours and findings obtained for certain samples of population for a longer duration may better represent the trends and explain the reasons for the changes via feedback, for instance interviews for clarification of matter. Repeated observations also provide higher accuracy in describing and explaining the changes in individuals instead of relying on data collected once at a particular time only. Thus, longitudinal research design yields better results in comparison with cross-sectional design in claiming a causal-effect relationship.

Conclusion

The present study has broaden the understanding on the relationships among extroversion, smartphone usage and smartphone addiction. This study explored the mediating role of smartphone usage in the relationship between extroversion and smartphone addiction among UTAR Kampar Campus students so that the addressed issue can be recognised and tackled. Process usage can completely mediate the pathway from extroversion to smartphone addiction. This study's results can be used as references for future researches, and for smartphone manufacturers, applications developer, government and individuals themselves to prevent or reduce smartphone addiction by targeting personality traits or certain smartphone features. However, the results cannot be overgeneralised to other population because the participants were selected using non-randomisation sampling method. Future studies should have a larger sample size and expand the sample to include individuals from all races, age groups and other demographic variables. Instruments used also have their limitations, such as the item wordings and inability to delve into more comprehensive answers may limit understanding on the individuals. A pilot study should be conducted to test the instruments' reliability and validity. Mixed methods research design could also be used to collect more accurate and comprehensive date instead of solely relying on self-report surveys.

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Appendix A

Questionnaire (Paper-and-pencil Survey)

UNIVERSITI TUNKU ABDUL RAHMAN
FACULTY OF ARTS AND SOCIAL SCIENCE
BACHELOR OF SOCIAL SCIENCE (HONS) PSYCHOLOGY

UAPZ 3023 Final Year Project II
Year 3 Trimester 3
(201810)

Introduction

This research study is being conducted on "Personality traits, smartphone usage and smartphone addiction: Their relationships among UTAR undergraduate students" as a requirement for the subject UAPZ 3023 Final Year Project II. In order to collect the required information, your participation is needed for our research study.

Procedures

You will be asked to complete the questionnaire which consists of 48 questions. You will take approximately 10-15 minutes to complete this survey.

Confidentiality

All information provided by the students will be subjected as private and confidential. The information use is solely for the purpose of this research. No personal identity and information will be revealed to a third party and only our group members have the access to the information.

Participation

You can voluntarily choose to participate or withdraw at any time without any penalty charged.

Contact information

If you have any questions or concerns, kindly contact our group member at yutee2109@gmail.com (Tee Xiang Yi).

_____ _____

Participant's signature Date

Part A-Demographic information

Please fill in your information and **TICK** in the box which corresponds to your status quo.

Age: _____

Gender: ☐ Male ☐ Female

Ethnicity: ☐ Malay ☐ Chinese

☐ Indian ☐ Others: _____(please

Year and Trimester of Study:

☐ Y1S1 ☐ Y1S2 ☐ Y1S3

☐ Y2S1 ☐ Y2S2 ☐ Y2S3

☐ Y3S1 ☐ Y3S2 ☐ Y3S3

☐ Y4S1 ☐ Y4S2 ☐ Y4S3

Other Year and Trimester of Study, please state:

Faculty:

☐ FAS ☐ FBF ☐ FICT

☐ FEGT ☐ FSc ☐ ICS

Do you have smartphone(s)? ☐ Yes ☐ No

Part B: How frequently do you use smartphone?

Instructions: Please read each statement and **CIRCLE** the number which indicates how much the statement applied to you. There are no right or wrong answers.

1 - Strongly Disagree
2 - Somewhat Disagree
3 - Somewhat Agree
4 - Strongly Agree

1.	I was told more than once that I spent too much time on smartphone.	1	2	3	4
2.	I feel uneasy once I stop smartphone for a certain period of time.	1	2	3	4
3.	I find that I have been hooking on smartphone longer and longer.	1	2	3	4
4.	I feel restless and irritable when the smartphone is unavailable.	1	2	3	4
5.	I feel very vigorous upon smartphone use regardless of the fatigues experienced.	1	2	3	4
6.	I use smartphone for a longer period of time and spend more money than I had intended.	1	2	3	4
7.	Although using smartphone has brought negative effects on my interpersonal relationships, the amount of time spent on Internet remains unreduced.	1	2	3	4
8.	I have slept less than four hours due to using smartphone more than once.	1	2	3	4
9.	I have increased substantial amount of time using smartphone per week in recent 3 months.	1	2	3	4
10.	I feel distressed or down once I cease using smartphone for a certain period of time.	1	2	3	4
11.	I fail to control the impulse to use smartphone.	1	2	3	4
12.	I find myself indulged on the smartphone at the cost of hanging out with friends.	1	2	3	4
13.	I feel aches and soreness in the back or eye discomforts due to excessive smartphone use.	1	2	3	4

14.	The idea of using smartphone comes as the first thought on mind when waking up each morning.	1	2	3	4
15.	To use smartphone has exercised certain negative effects on my schoolwork or job performance.	1	2	3	4
16.	I feel missing something after stopping smartphone for a certain period of time.	1	2	3	4
17.	My interaction with family members is decreased on account of smartphone use.	1	2	3	4
18.	My recreational activities are reduced due to smartphone use.	1	2	3	4
19.	I feel the urge to use my smartphone again right after I stopped using it.	1	2	3	4
20.	My life would be joyless hadn't there been smartphone.	1	2	3	4
21.	Surfing the smartphone has exercised negative effects on my physical health. For example, viewing smartphone when crossing the street; fumbling with one's smartphone while driving or waiting, and resulted in danger.	1	2	3	4
22.	I try to spend less time on smartphone, but the efforts were in vain.	1	2	3	4
23.	I make it a habit to use smartphone and the sleep quality and total sleep time decreased.	1	2	3	4
24.	I need to spend an increasing amount of time on smartphone to achieve same satisfaction as before.	1	2	3	4
25.	I cannot have meal without smartphone use.	1	2	3	4
26.	I feel tired on daytime due to late-night use of smartphone.	1	2	3	4

Part C: Why do you use your smartphone?

Instructions: Please read each statement and **CIRCLE** the number which indicates how much the statement applied to you. There are no right or wrong answers.

1 - Strongly Disagree
2 - Disagree
3 - Neither Agree Nor Disagree
4 - Agree
5 - Strongly Agree

Process Usage						
1.	I use my smartphone in order to escape from real-life.	1	2	3	4	5
2.	I use my smartphone in order to relax.	1	2	3	4	5
3.	I use my smartphone because it is entertaining.	1	2	3	4	5
4.	I use my smartphone because it informs me for things that happen in everyday life.	1	2	3	4	5
5.	I use my smartphone in order to stay up to date of the latest news.	1	2	3	4	5
6.	I use my smartphone because it helps me passing time.	1	2	3	4	5
7.	I use my smartphone because it's a pleasant break from my routines.	1	2	3	4	5
Social Usage						
1.	I use my smartphone to interact with people.	1	2	3	4	5
2.	I use my smartphone to maintain relationships.	1	2	3	4	5
3.	I use my smartphone to call other people.	1	2	3	4	5
4.	I use my smartphone to text message others.	1	2	3	4	5
5.	I use my smartphone to contact people through social media.	1	2	3	4	5

Part D: Are you extrovert or introvert?

Instructions: Please read each statement and **CIRCLE** the number which indicates how much the statement applied to you. There are no right or wrong answers.

1 – Very Inaccurate

2 – Moderately Inaccurate

3 – Neither Accurate Nor Inaccurate

4 – Moderately Accurate

5 – Very Accurate

1.	I am the life of the party.	1	2	3	4	5
2.	I don't talk a lot.	1	2	3	4	5
3.	I feel comfortable around people.	1	2	3	4	5
4.	I keep in the background.	1	2	3	4	5
5.	I start conversations.	1	2	3	4	5
6.	I have little to say.	1	2	3	4	5
7.	I talk to a lot of different people at parties.	1	2	3	4	5
8.	I don't like to draw attention to myself	1	2	3	4	5
9.	I don't mind being the centre of attention.	1	2	3	4	5
10.	I am quiet around strangers.	1	2	3	4	5

Thank you for your participation!

Appendix B

Questionnaire (Google Forms)

Personality traits, smartphone usage and smartphone addiction: Their relationships among UTAR undergraduate students

* Required

Introduction

This research study is being conducted on "Personality traits, smartphone usage and smartphone addiction: Their relationships among UTAR undergraduate students" as a requirement for the subject UAPZ 3023 Final Year Project II. In order to collect the required information, your participation is needed for our research study.

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You will be asked to complete the questionnaire which consists of 48 questions. You will take approximately 10-15 minutes to complete this survey.

Confidentiality

All information provided by the students will be subjected as private and confidential. The information use is solely for the purpose of this research. No personal identity and information will be revealed to a third party and only our group members have the access to the information.

Participation

You can voluntarily choose to participate or withdraw at any time without any penalty charged.

Contact information

If you have any questions or concerns, kindly contact our group member at yutee2109@1utar.my (Tee Xiang Yi).

Herewith, I confirm that I have read and understood the information above. *

◯ Yes, I AGREE to participate in this study

NEXT

Part A-Demographic information

Please fill in your information and TICK in the box which corresponds to your status quo.

Age *

Your answer

Gender *

- ○ Male
- ○ Female

Ethnicity *

- ○ Malay
- ○ Chinese
- ○ Indian
- ○ Other:

Year and Trimester of Study *

- ○ Y1S1
- ○ Y1S2
- ○ Y1S3
- ○ Y2S1
- ○ Y2S2
- ○ Y2S3
- ○ Y3S1
- ○ Y3S2
- ○ Y3S3
- ○ Y4S1
- ○ Y4S2
- ○ Y4S3
- ○ Other:

Faculty *

- ○ FAS
- ○ FBF
- ○ FICT
- ○ FEGT
- ○ FSc
- ○ ICS

Do you have smartphone(s)? *

- ○ Yes
- ○ No

BACK NEXT

Part B: How frequently do you use smartphone?

Instructions: Please read each statement and CHOOSE the number which indicates how much the statement applied to you. There are no right or wrong answers.

1 - Strongly Disagree
2 - Somewhat Disagree
3 - Somewhat Agree
4 - Strongly Agree

1. I was told more than once that I spent too much time on smartphone. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

2. I feel uneasy once I stop smartphone for a certain period of time. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

3. I find that I have been hooking on smartphone longer and longer. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

4. I feel restless and irritable when the smartphone is unavailable. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

5. I feel very vigorous upon smartphone use regardless of the fatigues experienced. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

6. I use smartphone for a longer period of time and spend more money than I had intended. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

7. Although using smartphone has brought negative effects on my interpersonal relationships, the amount of time spent on Internet remains unreduced. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

8. I have slept less than four hours due to using smartphone more than once. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

9. I have increased substantial amount of time using smartphone per week in recent 3 months. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

10. I feel distressed or down once I cease using smartphone for a certain period of time. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

11. I fail to control the impulse to use smartphone. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

12. I find myself indulged on the smartphone at the cost of hanging out with friends. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

13. I feel aches and soreness in the back or eye discomforts due to excessive smartphone use. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

14. The idea of using smartphone comes as the first thought on mind when waking up each morning. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

15. To use smartphone has exercised certain negative effects on my schoolwork or job performance. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

16. I feel missing something after stopping smartphone for a certain period of time. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

17. My interaction with family members is decreased on account of smartphone use. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

18. My recreational activities are reduced due to smartphone use. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

19. I feel the urge to use my smartphone again right after I stopped using it. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

20. My life would be joyless hadn't there been smartphone. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

21. Surfing the smartphone has exercised negative effects on my physical health. For example, viewing smartphone when crossing the street; fumbling with one's smartphone while driving or waiting, and resulted in danger. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

22. I try to spend less time on smartphone, but the efforts were in vain. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

23. I make it a habit to use smartphone and the sleep quality and total sleep time decreased. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

24. I need to spend an increasing amount of time on smartphone to achieve same satisfaction as before. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

25. I cannot have meal without smartphone use. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

26. I feel tired on daytime due to late-night use of smartphone. *

	1	2	3	4	
Strongly Disagree	○	○	○	○	Strongly Agree

BACK NEXT

Part C: Why do you use your smartphone?

Instructions: Please read each statement and CHOOSE the number which indicates how much the statement applied to you. There are no right or wrong answers.

1 - Strongly Disagree
2 - Disagree
3 - Neither Agree Nor Disagree
4 - Agree
5 - Strongly Agree

Process Usage

1. I use my smartphone in order to escape from real-life. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

2. I use my smartphone in order to relax. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

3. I use my smartphone because it is entertaining. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

4. I use my smartphone because it informs me for things that happen in everyday life. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

5. I use my smartphone in order to stay up to date of the latest news. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

6. I use my smartphone because it helps me passing time. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

7. I use my smartphone because it's a pleasant break from my routines. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Social Usage

1. I use my smartphone to interact with people. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

2. I use my smartphone to maintain relationships.

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

3. I use my smartphone to call other people. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

4. I use my smartphone to text message others. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

5. I use my smartphone to contact people through social media. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

BACK NEXT

Never submit passwords through Google Forms.

Part D: Are you extrovert or introvert?

Instructions: Please read each statement and CHOOSE the number which indicates how much the statement applied to you. There are no right or wrong answers.

1 – Very Inaccurate
2 – Moderately Inaccurate
3 – Neither Accurate Nor Inaccurate
4 – Moderately Accurate
5 – Very Accurate

1. I am the life of the party. *

	1	2	3	4	5	
Very Inaccurate	○	○	○	○	○	Very Accurate

2. I don't talk a lot. *

	1	2	3	4	5	
Very Inaccurate	○	○	○	○	○	Very Accurate

3. I feel comfortable around people. *

	1	2	3	4	5	
Very Inaccurate	○	○	○	○	○	Very Accurate

4. I keep in the background. *

	1	2	3	4	5	
Very Inaccurate	○	○	○	○	○	Very Accurate

5. I start conversations. *

	1	2	3	4	5	
Very Inaccurate	○	○	○	○	○	Very Accurate

6. I have little to say. *

	1	2	3	4	5	
Very Inaccurate	○	○	○	○	○	Very Accurate

7. I talk to a lot of different people at parties. *

	1	2	3	4	5	
Very Inaccurate	○	○	○	○	○	Very Accurate

8. I don't like to draw attention to myself *

	1	2	3	4	5	
Very Inaccurate	○	○	○	○	○	Very Accurate

9. I don't mind being the centre of attention. *

	1	2	3	4	5	
Very Inaccurate	○	○	○	○	○	Very Accurate

10. I am quiet around strangers. *

	1	2	3	4	5	
Very Inaccurate	○	○	○	○	○	Very Accurate

BACK SUBMIT

Never submit passwords through Google Forms.

Appendix C

SPSS Output: Cronbach's Alpha for International Personality Item Pool-Five Factor Model-50 (IPIP-5-50)

Scale: Extroversion

Case Processing Summary

		N	%
Cases	Valid	306	99.4
	Excluded[a]	2	.6
	Total	308	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.817	.816	10

Item Statistics

	Mean	Std. Deviation	N
DQ1	3.00	1.024	306
DQ3	3.33	.971	306
DQ5	3.31	1.001	306
DQ7	3.09	1.096	306
DQ9	3.02	1.132	306
RDQ2	3.12	1.170	306
RDQ4	2.93	.971	306
RDQ6	3.04	1.069	306
RDQ8	2.64	1.078	306
RDQ10	2.57	1.183	306

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
DQ1	27.05	36.797	.453	.292	.806
DQ3	26.73	37.682	.407	.274	.810
DQ5	26.74	35.735	.563	.360	.795
DQ7	26.96	34.270	.624	.466	.787
DQ9	27.04	35.661	.483	.276	.803
RDQ2	26.93	33.878	.604	.416	.789
RDQ4	27.12	37.359	.436	.302	.807
RDQ6	27.01	36.226	.475	.303	.804
RDQ8	27.41	37.213	.388	.180	.813
RDQ10	27.49	34.506	.545	.343	.796

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
30.05	43.479	6.594	10

Appendix D

SPSS Output: Cronbach's Alpha for Smartphone Addiction Inventory (SPAI) Scale

Scale: Smartphone Addiction

Case Processing Summary

		N	%
Cases	Valid	303	98.4
	Excluded[a]	5	1.6
	Total	308	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.919	.920	26

Item Statistics

	Mean	Std. Deviation	N
BQ1	2.78	.881	303
BQ2	2.45	.840	303
BQ3	2.81	.792	303
BQ4	2.34	.846	303
BQ5	2.34	.785	303
BQ6	2.13	.873	303
BQ7	2.39	.887	303
BQ8	1.97	1.035	303
BQ9	2.34	.776	303
BQ10	2.21	.794	303
BQ11	2.26	.858	303
BQ12	2.13	.800	303
BQ13	2.50	.913	303
BQ14	2.76	.920	303
BQ15	2.35	.832	303
BQ16	2.37	.859	303
BQ17	2.14	.882	303
BQ18	2.24	.868	303
BQ19	2.38	.784	303
BQ20	2.28	.954	303
BQ21	2.29	.953	303
BQ22	2.36	.758	303
BQ23	2.34	.837	303
BQ24	2.19	.782	303
BQ25	1.73	.854	303
BQ26	2.28	.940	303

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
BQ1	57.56	154.094	.457	.370	.917
BQ2	57.89	152.667	.554	.486	.915
BQ3	57.54	153.600	.542	.499	.915
BQ4	58.00	152.987	.533	.496	.916
BQ5	58.00	153.411	.557	.411	.915
BQ6	58.21	151.878	.569	.460	.915
BQ7	57.96	152.260	.540	.384	.915
BQ8	58.38	153.163	.415	.307	.918
BQ9	58.01	154.265	.519	.418	.916
BQ10	58.13	153.393	.551	.417	.915
BQ11	58.08	151.665	.590	.442	.915
BQ12	58.22	153.184	.558	.422	.915
BQ13	57.84	154.553	.418	.265	.918
BQ14	57.58	152.747	.496	.347	.916
BQ15	57.99	155.288	.428	.275	.917
BQ16	57.97	152.364	.555	.411	.915
BQ17	58.20	153.810	.470	.380	.917
BQ18	58.10	152.450	.544	.421	.915
BQ19	57.96	151.873	.641	.464	.914
BQ20	58.07	151.929	.512	.340	.916
BQ21	58.06	152.676	.479	.316	.917
BQ22	57.99	152.324	.640	.494	.914
BQ23	58.01	151.656	.607	.500	.914
BQ24	58.15	152.308	.619	.455	.914
BQ25	58.62	155.038	.428	.276	.917
BQ26	58.07	150.506	.585	.462	.915

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
60.34	164.869	12.840	26

Appendix E

SPSS Output: Cronbach's Alpha for Process and Social Usage Scale

Scale: Process and Social Usage

Case Processing Summary

		N	%
Cases	Valid	307	99.7
	Excluded[a]	1	.3
	Total	308	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.807	.818	12

Item Statistics

	Mean	Std. Deviation	N
CPQ1	2.56	1.179	307
CPQ2	3.78	.892	307
CPQ3	4.04	.797	307
CPQ4	3.98	.788	307
CPQ5	3.96	.874	307
CPQ6	3.70	.981	307
CPQ7	3.69	.927	307
CSQ1	4.02	.902	307
CSQ2	3.76	.980	307
CSQ3	4.14	.865	307
CSQ4	4.23	.813	307
CSQ5	4.22	.811	307

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CPQ1	43.52	34.387	.150	.115	.829
CPQ2	42.31	32.170	.484	.385	.790
CPQ3	42.05	31.926	.588	.458	.782
CPQ4	42.11	33.580	.401	.368	.797
CPQ5	42.13	32.837	.425	.384	.795
CPQ6	42.39	31.330	.507	.378	.787
CPQ7	42.39	31.658	.512	.423	.787
CSQ1	42.07	31.269	.573	.508	.781
CSQ2	42.33	32.214	.421	.402	.796
CSQ3	41.95	32.403	.478	.428	.790
CSQ4	41.86	32.297	.531	.485	.786
CSQ5	41.86	32.380	.522	.417	.787

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
46.09	37.858	6.153	12

Appendix F

SPSS Output: Cronbach's Alpha for Process Usage Subscale

Scale: Process Usage

Case Processing Summary

		N	%
Cases	Valid	308	100.0
	Excluded[a]	0	.0
	Total	308	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.734	.753	7

Item Statistics

	Mean	Std. Deviation	N
CPQ1	2.57	1.180	308
CPQ2	3.78	.891	308
CPQ3	4.05	.798	308
CPQ4	3.98	.789	308
CPQ5	3.96	.874	308
CPQ6	3.70	.979	308
CPQ7	3.69	.926	308

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CPQ1	23.17	13.350	.174	.092	.784
CPQ2	21.96	12.014	.556	.379	.677
CPQ3	21.69	12.163	.619	.433	.668
CPQ4	21.75	13.296	.404	.347	.712
CPQ5	21.77	13.090	.377	.336	.718
CPQ6	22.03	11.608	.551	.366	.676
CPQ7	22.04	11.712	.579	.417	.671

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
25.73	16.242	4.030	7

Appendix G

SPSS Output: Cronbach's Alpha for Social Usage Subscale

Scale: Social Usage

Case Processing Summary

		N	%
Cases	Valid	307	99.7
	Excluded[a]	1	.3
	Total	308	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.810	.813	5

Item Statistics

	Mean	Std. Deviation	N
CSQ1	4.02	.902	307
CSQ2	3.76	.980	307
CSQ3	4.14	.865	307
CSQ4	4.23	.813	307
CSQ5	4.22	.811	307

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CSQ1	16.36	6.923	.670	.484	.750
CSQ2	16.61	7.108	.545	.383	.793
CSQ3	16.23	7.564	.547	.385	.788
CSQ4	16.14	7.437	.636	.482	.763
CSQ5	16.15	7.550	.607	.384	.771

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
20.37	10.914	3.304	5

Appendix H

SPSS Output: Frequency Table for Demographic Information

Frequency Table

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18	15	4.9	4.9	4.9
	19	61	19.8	20.0	24.9
	20	56	18.2	18.4	43.3
	21	63	20.5	20.7	63.9
	22	65	21.1	21.3	85.2
	23	24	7.8	7.9	93.1
	24	14	4.5	4.6	97.7
	25	5	1.6	1.6	99.3
	26	2	.6	.7	100.0
	Total	305	99.0	100.0	
Missing	999	3	1.0		
Total		308	100.0		

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Male	152	49.4	49.4	49.4
	2 Female	156	50.6	50.6	100.0
	Total	308	100.0	100.0	

Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Malay	7	2.3	2.3	2.3
	2 Indian	37	12.0	12.1	14.4
	3 Chinese	253	82.1	82.7	97.1
	4 Others	9	2.9	2.9	100.0
	Total	306	99.4	100.0	
Missing	999	2	.6		
Total		308	100.0		

Year of Study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Y1S1	45	14.6	14.7	14.7
	Y1S2	70	22.7	22.8	37.5
	Y1S3	10	3.2	3.3	40.7
	Y2S1	22	7.1	7.2	47.9
	Y2S2	23	7.5	7.5	55.4
	Y2S3	11	3.6	3.6	59.0
	Y3S1	30	9.7	9.8	68.7
	Y3S2	33	10.7	10.7	79.5
	Y3S3	58	18.8	18.9	98.4
	Y4S1	2	.6	.7	99.0
	Y4S2	1	.3	.3	99.3
	Y4S3	2	.6	.7	100.0
	Total	307	99.7	100.0	
Missing	999	1	.3		
Total		308	100.0		

Faculty

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	FAS	134	43.5	43.5	43.5
	FBF	128	41.6	41.6	85.1
	FEGT	6	1.9	1.9	87.0
	FICT	21	6.8	6.8	93.8
	FSc	16	5.2	5.2	99.0
	ICS	3	1.0	1.0	100.0
	Total	308	100.0	100.0	

HaveSp

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Yes	308	100.0	100.0	100.0

Appendix I

SPSS Output: Descriptive Table for Summed Scores of Instruments

Descriptives

[DataSet1] C:\Users\HP\Downloads\FYP\FYP2\WorkingData_v2.sav

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SPAI	308	26	102	60.28	12.825	.030	.139	.587	.277
ProcessU	308	8	35	25.73	4.030	-.528	.139	1.446	.277
SocialU	308	9	25	20.35	3.325	-.401	.139	-.106	.277
Extro	308	13	50	30.03	6.582	.147	.139	.227	.277
Valid N (listwise)	308								

Appendix J

SPSS Output: Correlations among Variables

Correlations

		SPAI	ProcessU	SocialU	Extro
SPAI	Pearson Correlation	1	.299**	.030	.010
	Sig. (2-tailed)		.000	.594	.861
	N	308	308	308	308
ProcessU	Pearson Correlation	.299**	1	.390**	-.120*
	Sig. (2-tailed)	.000		.000	.036
	N	308	308	308	308
SocialU	Pearson Correlation	.030	.390**	1	.101
	Sig. (2-tailed)	.594	.000		.077
	N	308	308	308	308
Extro	Pearson Correlation	.010	-.120*	.101	1
	Sig. (2-tailed)	.861	.036	.077	
	N	308	308	308	308

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

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

Appendix K

SPSS Output: Mediation Analysis via Process Usage

```
************* PROCESS Procedure for SPSS Release 2.16.3 *****************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com

**************************************************************************
Model = 4
    Y = SPAI
    X = Extro
    M = ProcessU

Sample size
        308

**************************************************************************
Outcome: ProcessU

Model Summary
          R       R-sq        MSE          F        df1        df2
  p
      .1196      .0143    16.0617     4.4377     1.0000   306.0000      .0
360

Model
              coeff         se          t          p       LLCI       ULCI
constant    27.9322     1.0683    26.1465     .0000    25.8301    30.0343
Extro        -.0732      .0348    -2.1066     .0360     -.1416     -.0048

**************************************************************************
Outcome: SPAI

Model Summary
          R       R-sq        MSE          F        df1        df2
  p
      .3027      .0916   150.3779    15.3851     2.0000   305.0000      .0
000

Model
              coeff         se          t          p       LLCI       ULCI

constant    32.6070     5.8785     5.5468     .0000    21.0395    44.1745
ProcessU      .9698      .1749     5.5440     .0000      .6256     1.3140
Extro         .0906      .1071      .8457     .3984     -.1202      .3013

************************** TOTAL EFFECT MODEL ****************************
Outcome: SPAI

Model Summary
          R       R-sq        MSE          F        df1        df2
  p
      .0101      .0001   164.9913      .0309     1.0000   306.0000      .8
605

Model
              coeff         se          t          p       LLCI       ULCI
constant    59.6943     3.4239    17.4344     .0000    52.9569    66.4318
Extro         .0196      .1114      .1758     .8605     -.1996      .2388
```

```
****************** TOTAL, DIRECT, AND INDIRECT EFFECTS *********************

Total effect of X on Y
     Effect         SE          t          p       LLCI       ULCI
      .0196      .1114      .1758      .8605     -.1996      .2388

Direct effect of X on Y
     Effect         SE          t          p       LLCI       ULCI
      .0906      .1071      .8457      .3984     -.1202      .3013

Indirect effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
ProcessU    -.0710      .0387     -.1578     -.0015

Partially standardized indirect effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
ProcessU    -.0055      .0030     -.0121     -.0001

Completely standardized indirect effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
ProcessU    -.0364      .0198     -.0813     -.0005

Ratio of indirect to total effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
ProcessU   -3.6250    42.5631  -990.7966    -1.7246

Ratio of indirect to direct effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
ProcessU    -.7838    22.7372  -116.8403      .2802

R-squared mediation effect size (R-sq_med)
            Effect    Boot SE   BootLLCI   BootULCI
ProcessU    -.0020      .0046     -.0138      .0049

******************** ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence interv
als:
     5000

WARNING: Bootstrap CI endpoints below not trustworthy.  Decrease confidenc
e or increase bootstraps
  -990.7966

Level of confidence for all confidence intervals in output:
    95.00

NOTE: Kappa-squared is disabled from output as of version 2.16.

------ END MATRIX -----
```

Appendix L

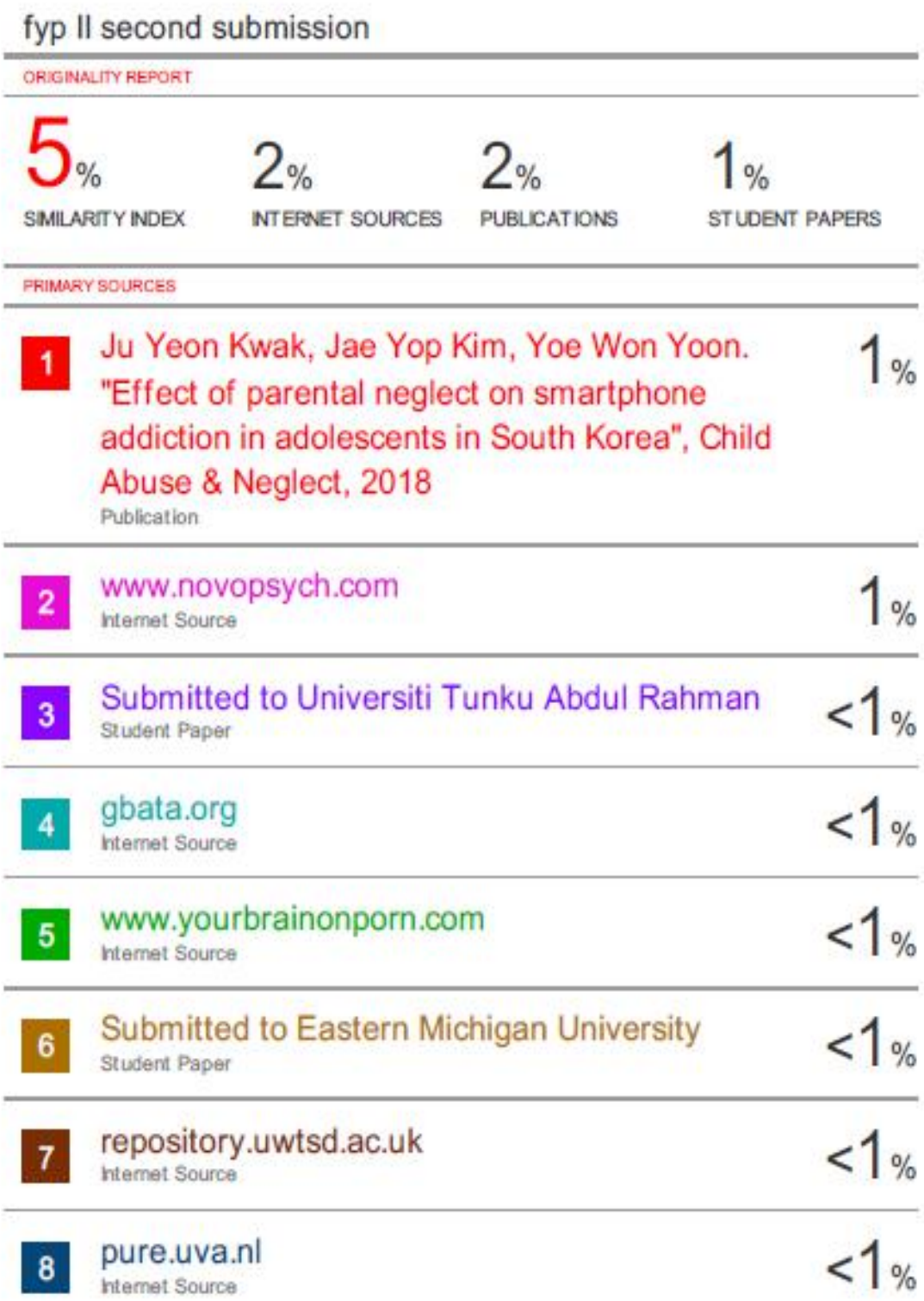
SPSS Output: Mediation Analysis via Social Usage

```
************* PROCESS Procedure for SPSS Release 2.16.3 *****************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com

**************************************************************************
Model = 4
    Y = SPAI
    X = Extro
    M = SocialU

Sample size
        308

**************************************************************************
Outcome: SocialU

Model Summary
          R       R-sq        MSE          F        df1        df2
  p
      .1009      .0102    10.9780     3.1475     1.0000   306.0000      .0
770

Model
              coeff         se          t          p       LLCI       ULCI
constant    18.8167      .8832    21.3053      .0000    17.0788    20.5546
Extro         .0510      .0287     1.7741      .0770     -.0056      .1075

**************************************************************************
Outcome: SPAI

Model Summary
          R       R-sq        MSE          F        df1        df2
  p
      .0313      .0010   165.3872      .1492     2.0000   305.0000      .8
615

Model
              coeff         se          t          p       LLCI       ULCI

constant    57.5350     5.4022    10.6504      .0000    46.9048    68.1652
SocialU       .1148      .2219      .5172      .6054     -.3219      .5514
Extro         .0137      .1121      .1225      .9026     -.2068      .2343

************************** TOTAL EFFECT MODEL ****************************
Outcome: SPAI

Model Summary
          R       R-sq        MSE          F        df1        df2
  p
      .0101      .0001   164.9913      .0309     1.0000   306.0000      .8
605

Model
              coeff         se          t          p       LLCI       ULCI
constant    59.6943     3.4239    17.4344      .0000    52.9569    66.4318
Extro         .0196      .1114      .1758      .8605     -.1996      .2388
```

```
****************** TOTAL, DIRECT, AND INDIRECT EFFECTS ********************

Total effect of X on Y
     Effect         SE          t          p       LLCI       ULCI
      .0196      .1114      .1758      .8605     -.1996      .2388

Direct effect of X on Y
     Effect         SE          t          p       LLCI       ULCI
      .0137      .1121      .1225      .9026     -.2068      .2343

Indirect effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
SocialU      .0058      .0146     -.0145      .0498

Partially standardized indirect effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
SocialU      .0005      .0011     -.0012      .0040

Completely standardized indirect effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
SocialU      .0030      .0075     -.0075      .0259

Ratio of indirect to total effect of X on Y
            Effect    Boot SE   BootLLCI   BootULCI
SocialU      .2987   355.7805      .0732   141.1054

Ratio of indirect to direct effect of X on Y

            Effect    Boot SE   BootLLCI   BootULCI
SocialU      .4259    15.0474      .1566   687.0340

R-squared mediation effect size (R-sq_med)
            Effect    Boot SE   BootLLCI   BootULCI
SocialU      .0001      .0010     -.0012      .0036

******************** ANALYSIS NOTES AND WARNINGS *************************

Number of bootstrap samples for bias corrected bootstrap confidence interv
als:
     5000

Level of confidence for all confidence intervals in output:
    95.00

NOTE: Kappa-squared is disabled from output as of version 2.16.

------ END MATRIX -----
```

Appendix M

Turnitin Originality Report



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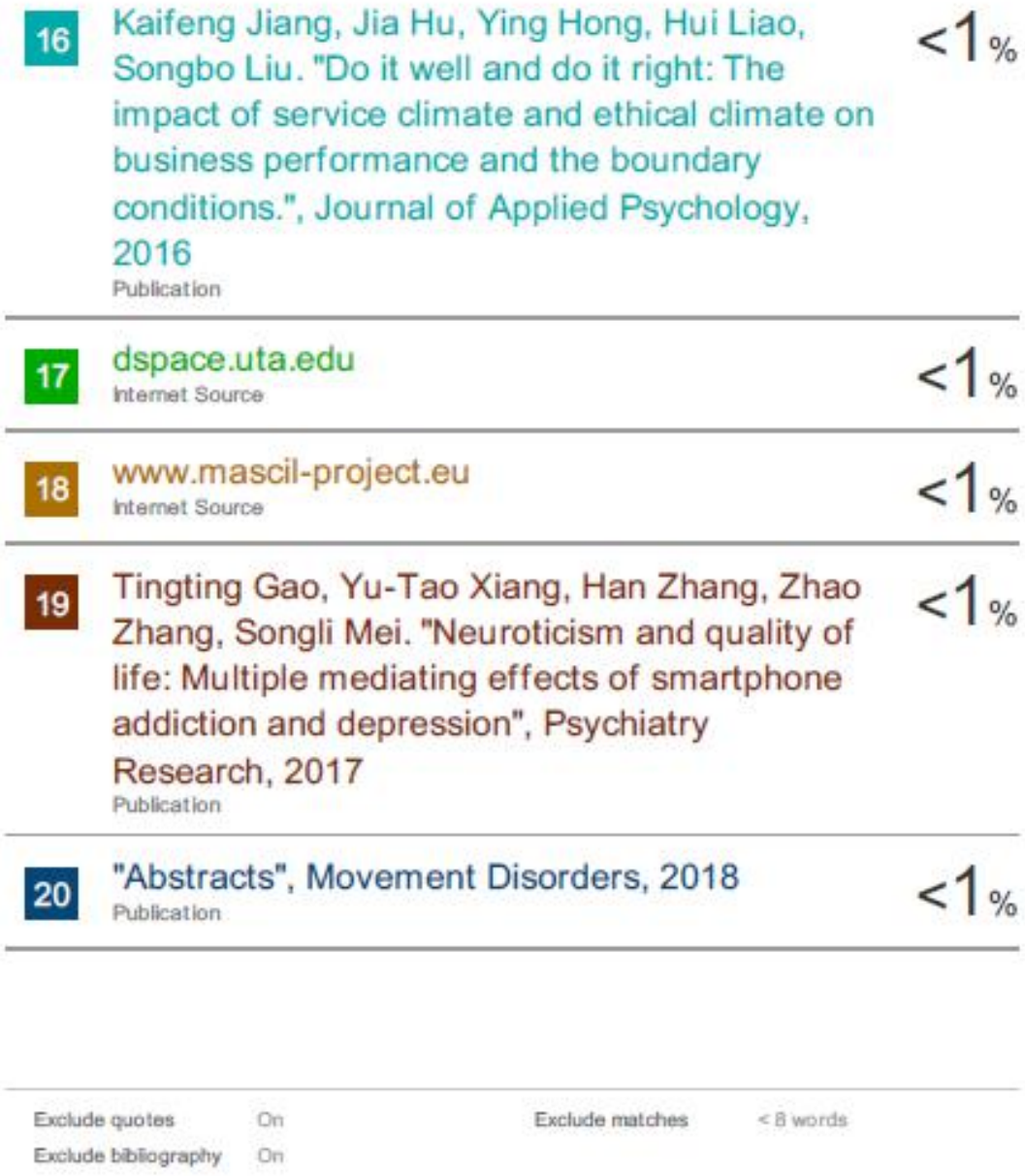

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