RELATIONSHIP BETWEEN SMARTPHONE ADDICTION AND SLEEP

QUALITY AMONG UTAR UNDERGRADUATE STUDENTS

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Relationship between Smartphone Addiction and Sleep Quality

among UTAR Undergraduate Students

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APPROVAL FORM

This research paper attached hereto, entitled "A Study of The Relationship between Smartphone Addiction and Sleep Quality among UTAR Undergraduate Students" prepared and submitted by" Ambalakalidachayini Devi a/p Ravi and Ngam Siew Lee" in partial fulfillment of the requirements for the Bachelor of Social Science (Hons) Psychology is hereby accepted.

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Supervisor

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Abstract

The smartphone addiction issue is rising over recent years. Nowadays, people are facing sleeping problems and have poor sleep quality that caused by smartphone addiction. The current study is a cross-sectional study and a survey methodology that focused to examine the relationship smartphone addiction and sleep quality among UTAR undergraduate students. A total of 176 respondents were recruited in the present study by utilizing convenience sampling, a non-probability sampling method, by distributing the online survey through Whatsapp, Facebook and QR code. The participants have been recruited which are undergraduates under the age range of 18 to 26 years old. In the present study, number of female respondents are 115 and male respondents are 61that included Chinese, Indian, Malay and other ethnicity namely Siamese and Mauritian. The result in the present study reported a significant positive correlation between smartphone addiction and sleep quality among UTAR undergraduate students through Pearson Correlation Coefficient and Independent sample t-test. However, there were no significant gender differences in smartphone addiction and sleep quality among UTAR undergraduate students. The results of the current study can be used as a source of information for further exploration of the relevant topic.

Keywords: Smartphone Addiction, Sleep Quality, Gender Differences

DECLARATION

We declare that the material contained in this paper is the end result of our own work and that due acknowledgement has been given in the bibliography and references to ALL sources be they printed, electronic or personal.

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Abbreviations

1. MCMC   -   Multimedia communication and multimedia commission

2. UTAR   -   Universiti Tunku Abdul Rahman

3. NSF   -   National Sleep Foundation

4. SPAI   -   Smartphone Addiction Inventory Scale

5. REM   -   Rapid Eye Movement

6. UGT   -   Uses and Gratification Theory

7. TPB   -   Theory of Planned Behavior

Chapter 1

Introduction

Background of Study

      At the moment, sleeping problems and poor sleep quality have emerged with smartphone addiction where it produces an unhealthy lifestyle (Wang et al., 2019)**.** Across the time technology has been developed where everyone believes and utilizes the smartphone as an incredible tool. Therefore, people have started using smartphones to replace personal computers that cause smartphone's characteristics that make peoples' lives more convenient and easy to bring nowadays and across all generations. There are three different characteristics of smartphone addiction which are, the smartphone usually needs to be turned on, rely on the smartphone even though there are a house telephone and encounter financial burdens and social conflicts due to the overuse of smartphones on their daily basis. In addition, the smartphone provides more functions in terms of information, updates, education, interaction or communication, entertainment, games and more. These functions make people's life easier and more comfortable, as well as smartphones bring convenience in people's daily lives or routines.

      Besides that, the transition happens between the gadgets in this technology era where people from older generations like baby boomers and generation X were using a typewriter and personal computer in their life, but nowadays every person in this world across all the generations start to use a smartphone. This is because the smart features in the smartphone make people's lives more comfortable compared to use a typewriter or personal computer. People get addicted to the smartphone because of applications, online surfing, online readings and online games that make them have a desirable feeling. Furthermore, it has been demonstrated that generation Y has acquired knowledge about technology and they also mastered technology compared to generation X cause generation Y utilize more smartphones,

internet, social media technologies and laptop in their daily lives (Sumari et al., 2013). According to Statista, the number of smartphone users in Malaysia was approximated to achieve almost 18.4 million, yet in the year 2019, it has been claimed that smartphone users will be over 50 percent nearly to achieve 1.5 billion (Statista, 2019).

Furthermore, past research explains that females have high levels of smartphone addiction compared to males where female tend to use their smartphone for longer period than male. This is because females are more likely to be involved in smartphone activities and they tend to reveal high preferences on smartphone activities compared to males (Ionut et al., 2016). Besides that, another study exposed that females use their smartphone for camera, music and education whereas males were more likely to use their smartphone for phone calling, music and playing games (Dr. Vaidya et al., 2016).

Moreover, females have a greater proneness toward smartphone addiction than male, as the consequences more females encounter sleeping problems (Wang et al., 2019). Because of smartphone addiction people do not get a proper sleep and this causes them to have various health problems such as insomnia, vision problems, wrist or hand pain and more (Carbonell et al., 2018. People use smartphones to satisfy their desires and obtain positive emotions in order to escape from unpleasant situations. In the fact that overuse smartphone eventually leads to smartphone addiction and this disrupts the mental health functions of the person. In addition, overuse smartphone becomes a risk factor to mental health especially to the young adults who face sleeping problems, sleeping disturbances and other problems in their life.

Although smartphones provide convenience to the people, it also brings a negative impact on the people around the world where smartphones have become an addiction among the people across different life stages. Individuals who get influenced in smartphone addiction are more likely to experience various harmful effects in terms of physical, psychological and physiological problems (Randler et al., 2016). Furthermore, smartphone

addiction becomes an interruption in people's daily lives where people tend to spend their whole time with their smartphone and this effect their sleep quality. There are many issues demonstrated that smartphone addiction has changed the life pattern of a person especially the person's sleeping pattern where the person's sleep habits get interrupted and they are unable to live a normal life.

In conclusion, smartphone addiction had raised concerns, especially in today's digital era where it is important to give attention toward smartphone addiction and raise awareness in order to make the people to know and understand the negative impact and the effects of smartphone addiction by an implement or propose some strategies in order to reduce or prevent individuals from getting influenced and addicted toward smartphones which become a hassle and problematic that affects their life.

Problem Statement

Psychological problems are one of the main effects that can be found in students caused by smartphone addiction and this psychological effect is increasing day by day among the students. Students encounter psychological problems especially sleeping problems that lead to more severe problems and also give more negative impacts on them. This psychological problem results in by smartphone addiction where it has been reported that there is an association between smartphone addiction and sleep quality. At the same time, a study found that 75.6 percent of individuals who are from 21 to 25 age groups have been exhibited in smartphone addiction. This is because students want and usually rely on their smartphones where they exploit smartphones to communicate, get information and entertainment. Nowadays students communicate with others, especially to their friends and family through their smartphones also students keep virtual groups in order to discuss the assignment, education matter, and other details. This is because it allows them to avoid direct interaction or face-to-face communication with other people (Parasuraman et al., 2017).

Although, smartphones bring convenience to the people through the smart functions and features, yet it affects the direct interaction among people which raised more attention and awareness on this smartphone addiction.

Furthermore, students encounter sleeping problems and having poor sleep quality due to the improvement in mobile technology where students tend to depend on the gadget. Everyone has own at least one smartphone around the world. In the fact that there are over 1.5 billion people have smartphones with them around the world. In a survey by Multimedia communications and multimedia commission (MCMC), it has been claimed that among the 2401 smartphone users, 71.4 percent of users keep on checking their smartphone even though there are no phone calls or notifications. Apart from that, 51.5 percent of smartphone users demonstrated that mobile phones are an important tool for them (MCMC, 2014).

Besides that, the number of smartphone users has been rise up in Malaysia. This is because people keep mobile internet or data on their smartphones where they get to access the internet every day. The findings exposed that Malaysia is the top five countries to use mobile internet through a smartphone which indicates 75 percent smartphone users access the internet on their mobile phones in the past 30 days (Statista, 2016). As a result, the students tend to lose their good sleep to utilize their smartphones where it may give a great impact on their life.

According to a news report, it has been found that sleep texting has been raised among college students where they tend to use their smartphones late at night to message their friends. A study also emphasizes that the students who are studying in university or college use their smartphones all the time due to multiple and smart functions of smartphones (Parasuraman et al., 2017). A finding from Journal American College Health proposed that 25.6 percent of college students use their smartphone which influences their quality sleep (Star, 2018). This causes the students to have poor academic achievement also unable to

concentrate on their academic performances as well as they face a variety of health conditions.

Furthermore, in the year 2016, research by Kadir Demirci indicates that quality sleep has shown a link with smartphone addiction and overuse where the study showed that females significantly addicted to a smartphone compared to males (Demirci et al., 2015). Based on a news report, it emphasizes that most Malaysians lose their beauty of sleep cause of their room brightness and lighting. Nowadays Malaysians encounter sleeping problems where their bedtime habits have been changed due to smart apps and gadgets. The findings presented that usage of "Whatsapp" has recorded as second highest penetration rate in 2017 at 68 percent population and it has been found that 72.9 percent Malaysians use "Whatsapp" late at night (Chung, 2019).

Besides, it has been claimed that smartphone addiction has a strong connection with sleep quality where it can be found an increase in sleeping problems, sleep disorder and sleep disturbance among the people, especially in students. It is important to investigate smartphone addiction among university students cause there is a strong link between the smartphone addiction issue and the students. This is because currently everyone is getting addicted to their smartphone that negatively affects their lifestyle. People are not aware of this smartphone addiction issue where they tend to take it easy and just continue to use their smartphone which influence their behavior and cause negative consequences to them. Besides, there is number of different effects of smartphone addiction namely physical effects, psychological effects and more (Villa, 2019).

As we know that younger generations or modern generations especially college and university students are lacking sleep and facing some sleeping problems, also having poor sleep quality where the students rely on their smartphone where they cannot live without their smartphone. This reinforces us to conduct the study on smartphone addiction and sleep

quality among undergraduate students, cause the students to depend more on their smartphone and they are willing to lose their beauty of sleep. It has been reported that students do not get a proper sleep, where they less than seven hours a day because they use their mobile phones during bedtime which drags their sleep time and this causes them not able to get complete sleep (Fahad et al., 2016).

On top of that, an argument by a researcher has been found which revealed that gender differences are a weak predictor of problematic smartphones. This is because a study shows that females are more likely to have a high usage of the smartphone compared to males. However, Asian countries indicate critical gender differentiation than western countries (Oktuğ, 2012). Due to the inconsistent result of gender differences in smartphone addiction, our present study focuses on the relationship between smartphone addiction and sleep quality among undergraduate students across different gender in Malaysia.

Moreover, it is vital to examine these two variables which are smartphone addiction and sleep quality, since both variables have an association and this has been an important and common issue among the people around the world that need to be prevented before it gets worse. Hence, the purpose of this research is to study the relationship between smartphone addictions and sleep quality among undergraduate students in UTAR.

In conclusion, our study will contribute the information and awareness to the public and society regarding the smartphone addiction issue and the psychological effects especially poor sleep quality caused by smartphone addiction. Besides, we are expecting our research and the results of our study can give the conscious about the seriousness of this issue and also prevent this smartphone addiction among the people that lead to having an imbalanced life also give a better life for the people and society.

Research Questions

1. Is there any significant relationship between smartphone addiction and sleep quality?

2. Is there any significant gender difference in smartphone addiction among undergraduate students in UTAR?

3. Is there any significant gender difference in sleep quality among undergraduate students in UTAR?

Research Objectives

The main objective of this study is to investigate the relationship between smartphone addictions and sleep quality among undergraduates. Our current study will focus on the significant correlation between smartphone addictions and sleep quality among undergraduate students in UTAR. Our study will be carried out to examine significant gender differences in smartphone addictions and sleep quality among undergraduate students in UTAR.

Hypotheses

H1: There is a significant relationship between smartphone addiction and sleep quality.

H2: There is a significant gender differences in smartphone addiction among undergraduate students in UTAR

H3: There is a significant gender differences in sleep quality among undergraduate students in UTAR

Significance of the Study

Undergraduate students face imbalance sleeping duration may cause poor quality of sleep. Yet, they are the group that spending their time on their smartphones such as playing online games, entertainment, watching dramas or movies, socially interacting and academic purposes. However, the relationship between smartphone addiction and sleep quality among UTAR undergraduate students is being examined to understand whether there is any relationship occurs between smartphone addiction and sleep quality among UTAR undergraduate students. This study brings an effect to the public to be aware of that facing a

higher level of smartphone addiction implies a poorer sleep quality among UTAR undergraduate students. This study can contribute the data recruited into understanding the level and effects of smartphone addiction among undergraduate students.

Furthermore, applications invented for smartphones which convenient society to communicate, surf the internet, document managing and organize. A smartphone is an electric appliance that not only uses for its vast functioning calling, delivery messages but can be used for browsing, social network chatting, audio and video online games. Applications invented for a smartphone seems like a multitask helper for students especially young adults. The internet use from smartphones improving remarkably regards most applications invented for smartphone is based on the internet and served attractive features (Islam et al., 2010).

Moreover, there has been a lack of researches in the past, this current research will conduce to the advantage of the young adults, as long as this research aimed at undergraduate students in Malaysia. Therefore, it may also refer to the key point for the students to reform their time on spending smartphone for any purposes. Unsuitable or overuse on smartphone may cause issues of physically and mentally health, which may affecting personal's sleeping quality and anxiety enhancement. In facts, it may imply a poorer sleeping quality more likely to exist under numerous of risk issues or a higher level of smartphone addiction may be examined among them. Nevertheless, this study can be referred as knowledge and contextual information for public whether smartphone addiction performed by people or friends which surround them regarding to poor sleep quality, may assure in contributing an approximately more helpful and useful advises and information due to this problem (Yusuf et al., 2018).

In conclusion, based on the statistics data, hopefully, our study may raise awareness among college and university students also to the public and society. The outcome of this study will be helpful and beneficial for the counsellors, psychologists in order to assist students to be more aware of smartphone addiction by implementing some exhibitions,

seminars, awareness booths and more for the students. We hope our study can be a worthwhile and knowledgeable reference to other future researchers who are interested to study in this topic.

Conceptual Definitions

Smartphone addiction. A smartphone is a tool that performs any task and has many similar functions like a computer. Smartphone addiction is defined as a circumstance that is connected with uncontrollable of smartphone use. According to Cha and Seo (2018), smartphone addiction is a continuous action in utilizing mobile phones where the person unable to regulate the usage without conscious about the harmful effects that can lead to many problems to the person. The smartphone brings pleasure and it became a desire to a person which can be a disruption in their life (Seo, 2018). Besides, smartphone addiction is reflected as behavioral addiction where people rely on their mobile phone for a whole day without getting aware of the situation or environment. The symptoms of smartphone addiction are keeping on checking their mobile phone for no reason, the usage get more intense, feel anxious without the smartphone, disruption on their daily routine activities where they easily get distracted by the smartphone functions or applications (Moattari et al., 2017).

Sleep quality. Sleep quality is described as the sleep experience that makes the person satisfied. Sleep quality is referred to the combined aspects of sleep initiation, sleep maintenance, sleep quantity and refreshment upon the awakening of a person (Kline, 2013). Besides that, based on the study, it has been expressed that the quality of sleep eventually produces a good sleep or feeling of rehabilitating upon awake. In the fact that, good sleep or quality sleep commonly correlated with good health. Poor sleep quality leads to insomnia and other sleeping problems. According to the National Sleep Foundation (NSF), the key indicators of good sleep quality are sleeping more time while in bed, falling asleep in 30

minutes or less, waking up more than once per night and stay awake for 20 minutes or less after initially falling asleep (Foundation, 2017).

Operational Definitions

      Smartphone addiction. Smartphone addiction is measured by the Smartphone Addiction Inventory Scale (SPAI), a 26-items scale with four different subscales which are compulsive behavior, functional impairment, withdrawal, and tolerance. Besides that, this scale will be used to measure the level of smartphone addiction. A higher score shows a high level of smartphone addiction (Lin et al., 2014).

      Sleep Quality. Sleep quality is measured by the Sleep Quality Scale which consists of 28-items that six domains of sleep quality which are daytime symptoms, restoration after sleep, problems initiating and maintaining sleep, difficulty walking and sleep satisfaction. This scale will be used to evaluate the sleep quality. Additionally, the higher scores exhibit reduce more severe sleep problems (Yi et al., 2006).

Chapter II

Literature Review

Theoretical Framework

  Uses of Gratification Theory. According to Mehrad and Tajar (2016), Uses and Gratification Theory (UGT) is one of the theories of interactions that regarded on social interaction and communication. UGT accommodates a functionalist's way of interaction and needs. UGT can be referred to like people are seeking to communicate to fulfill their needs to be caused by the psychological and social situation. Besides, their communicative behavior influences their needs. According to a past study, UGT can be defined that people's stimulation for fascinating with technology can be categorized into instrumental and conventional purposes. Thus, the instrumental needs of technology are goal-oriented and determined, meanwhile, conventional needs are perpetual and diversionary. However, different usage of smartphone functions may meet to differences in priorities and needs (Hiniker et al., 2016). According to an earlier study, therefore, the five needs emphasized in this theory are cognitive, affective needs, personal consolidate needs, social needs, and escapism needs (Katz et al, 1973). Besides, the gratification of the need to interact with other individuals on social media platforms is a program of gratification, where the people get gratification only from being included in the interaction process than message content (Chen et al., 2011).

  However, Joo and Sang (2013), UGT may categorize media usage into two different types which are instrumental and ritualized. Ritualized helps to fulfill abstract requirements like adventure, seeking advice and curiosity. Nevertheless, instrumental use gives information demand that satisfies the users' goal-directed needs for example financial issues, searching for information about mental health problems or useful hints for daily life (Joo, 2013)

Theory of Planned Behavior. Theory of Planned Behavior is a theory that applied to interpret how people's motivational aspects clarify the probability of presenting behaviors of health. According to a previous study, TPB has been used to comprehensive a series of health actions involving sleep hygiene which related with sleep quality. TPB assumes that a behavior with deliberate intention, such as appealing in healthy sleep style, is best forecasted by one's behavioral intention. Behavioral intention is clarified by one's attitude, perceived norms and perceived behavioral control. That fact that numerous aspects influenced students' sleep quality is in line with occurring theories that behavior of health involving sleep, are effected by individual, environmental and social factors (Strong et al., 2017).

Moreover, TPB is well developed that norms managed by peers affect young adults' health behaviors. Social norms have predicted sleeping time in undergraduates, it suggests that peers more likely to socialize late at night may bring a social norm by staying up very late become normalized. The possibility in which individual and social norms influence sleep quality (Knowlden et al., 2012). The past study shows that smartphone addictions as an important aspect influencing sleep quality. The research has been emphasized that scant contact hours to carry on their social life and entertainment by using their phone appeared to worsen poor sleep quality, as they allowed students to be trapped in a cycle of very late nights and sleep-deprived the following day (Foulkes et al., 2019).

Conceptual Framework
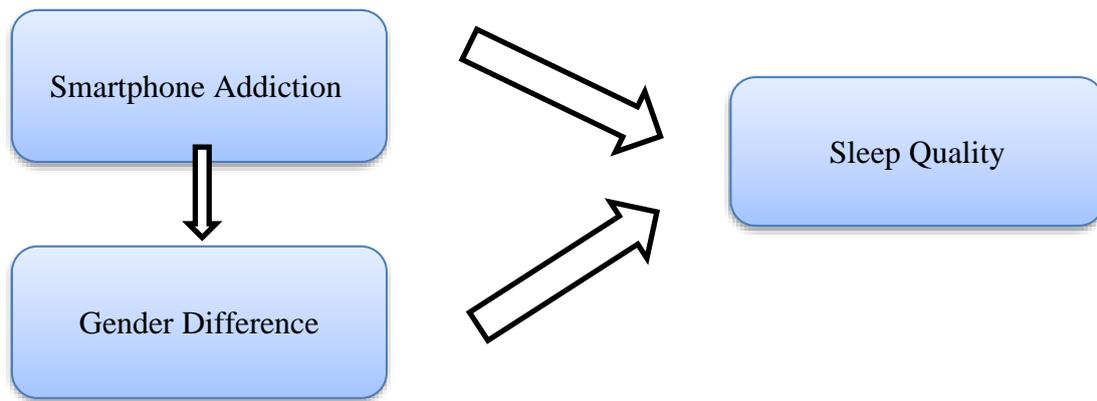
Figure 1. Conceptual framework model

Based on past studies, the conceptual framework model is proposed and demonstrated as shown in Figure 1, about the relationship between smartphone addiction and sleep quality in undergraduate and the gender differences in both variables. In this framework, smartphone addiction is the predictor variable, whereas sleep quality is the outcome variable. Besides that, it has been explained that smartphone addiction affects sleep quality. This is because individuals get addicted to a smartphone to satisfy their desire and want to escape from unpleasant situations. Smartphone addiction is developed from smartphone usage or overuse. Therefore, this study will examine the relationship between smartphone addictions and sleep quality. Also, the gender difference in smartphone addiction and sleep quality among UTAR undergraduate students.

Smartphone Addiction and Sleep Quality

According to a prior study, it has been manifested that smartphone usage is increasing from time to time along with the development of technology and digital. Smartphones are not only providing calls and messages like those days, but it goes beyond that. Nowadays, all smartphones can access the internet, social network, online games and more. Smartphone addiction is caused by the engagement of the smartphone in daily life. In this digital and modern era, smartphones have special and extraordinary functions that insist the people use

more time on the smartphone. Nevertheless, these smart functions and features of a smartphone lead a person to have poor sleep quality, lack of concentration and waste their precious time. It has been explained that, people who are addicted to the smartphone more likely face sleeping problems or disturbances that affect their concentration and academic achievement. Besides, there is a past study indicates that there is no relationship between mobile phone usage and sleep duration, but this study reported that there is a significant positive relationship between smartphone addiction and sleep quality. In this study, a total of 610 participants have participated and the result shows that 68.4 percent of the students have poor sleep quality where the students get their sleep just for six hours per day. From the findings, it revealed that 73.4 percent out of 610 participants use their smartphone for more than five hours per day, and the applications that have used often by the students are "Whatsapp", "Snapchat", "Youtube", "Instagram", "Twitter" and "Facebook". It has been reported that the mean checking "Whatsapp" was ten times per day. Furthermore, throughout this study, it has been exposed that, females are depending more on their smartphone compared to males. This is because females use smartphones to interact with their friends and family in order to establish and maintain interpersonal relationships. Based on the result of this study, two-thirds of the participants have described having poor sleep quality. This is because the participants spending more time on smartphones. To conclude, throughout this research it has been revealed that mobile phone dependency has a significant relation with poor sleep quality (Nahla et al., 2018).

In addition, research by Moattari (2017), demonstrates that people tend to use smartphone cause of accessible and informative devices. Mobile phone addiction involves four main elements which are obsessive phone use, behaviors like repetitive checking for messages or updates, tolerance or longer and more intense use, withdrawal or feeling of distress or suffering without a mobile phone. Moreover, the internet is the petrol for the

smartphone addiction where people access their smartphone to look upon on the latest applications and updates, smart functions or features, video calling, online games, and social media. As a result, smartphones become progressively crucial among people in the world. Smartphone addiction can be troublesome where it can reduce social interaction, decrease the academic ability, relationship problems, and physical health-related problems. It has been reported excessive smartphone use leads to problem in sleep quality where it reduces the rapid eye movement (REM) and sleeps efficiency. In fact that, smartphone addiction affects the person sleep by replacing regular or good sleep into smartphones and internet-accessible devices or technologies, the light emission from the smartphone screen and the microwave or radiation from the mobile phone that cause the people to face sleep disturbances and stay awake for the whole night. Besides, the result of this study indicates that the number of male smartphone users with poor sleep quality is more than good sleep quality. This is because the submission of the radiation and light emission of the smartphone affects the sleep duration and sleep efficiency. Last but not least, there is a correlation between smartphone addiction and sleep disturbance that bring a negative impact by reducing sleep quality and increasing the risk of getting sleep disorders (Moattari et al., 2017).

On top of that, according to a previous research, several risk factors are closely associated with people's lives with the overuse of smartphones. Having reviewed related work, the study has shown the main body of the research reported a possible relationship between smartphone use and psychological symptoms among college students, depressive disorders and poor sleep quality were the impact of the high rate of smartphone use. Smartphone use for contacting after lights out was linked with the sleep disorder. From the finding, the composite Scale for Moningness attains the best predictor for excessive smartphone use, students who evening-oriented attained higher on the Mobile Phone Problem Usage Scale. Increased level of excessive smartphone use has been associated with poorer

sleep quality. The use of smartphones at night could have definitely affected the results of the study which severe inopportune exposure and neurobehavioral function to shortwave light causes a failure of the circadian timing system which consequences in sleep disorders and depressive symptoms (Tao et al., 2017).

Moreover, according to Randler (2016), there is a preference for the use of chronotype or circadian which associated with an endogenous circadian clock that coexisted to a whole day. Super-categories can be defined by combining two or more categories as "morning type", "neither type", and "evening type" for circadian preferences. Several studies showed that emitting night from media screen may delay the circadian rhythm before sleep. Meanwhile, study found that interacting and using information electrical devices such as smartphones well associated with later bedtimes and excessive smartphone use significantly to sleep problems such as sleep disturbances and sleep quality. There is a preference for the use of evening-oriented is associated with smartphone addiction which using the smartphone to access through the internet. In this study, a total of 342 younger adolescents have participated and the result shows short sleep duration participants having higher smartphone use, evening-oriented is associated with excessive use of the smartphone. In addition, this leads to further problems of using the smartphone after going to bedtime leads to growing sleep problems. Several studies have shown that eveningness spends longer screen time and it is a positive correlation between sleep quality and over usage of smartphones. In the conclusion of the study, the circadian typology of the evening will be considered as a risk factor for smartphone addiction (Randler et al., 2016).

Gender Differences in Smartphone Addiction

According to Hafidha (2015), it has been emphasized that university students are the main consumer group of the smartphone compared to other age group people. Smartphone has become an important tool for every student where they tend to use their smartphone to

utilize the smart application and new function, not only that they use smartphone to talk with others, get updates and details from online source through internet access by surfing, entertainment like video or online games, listening to music and watching movies which make them escape from unpleasant situations, in fact, smartphone addiction does not produce any observable symptoms. Moreover, there are two different results have been proposed regarding the gender differences in smartphone addiction. A finding demonstrated that females are highly dependent on smartphones than males. This is because they utilize their smartphone in order to escape from uncomfortable situations or moods, to build and maintain social relationships, in urgency cases, to express their emotions and to satisfy their relationship with others. Nevertheless, a finding explained that males spent more time on their smartphone than female where males tend to use their smartphone for sensation seeking and mostly use in dangerous situations whereas females use smartphones for urgency purposes. Besides that, the result shows males from 21 to 23 years of age group tend to get more voice calls and text messages compared to females. However, it has been claimed that students across different gender utilize their smartphones to contact people especially friends, classmates, lectures for education purposes also they share details or urgent matters through mobile phones. Although, the students use their smartphone in a useful way, yet this mobile phone addiction causes them to have poor sleep where they tend to make a call or send a message to others especially to their friends or colleagues late at night. Nevertheless, the students have accepted the fact that smartphones bring negative consequences to them where they waste their precious time, cost and energy (Hafidha et al., 2015).

On top of that, evidence from several cohort studies indicates that gender differences may be present concerning the level of addiction. Besides, data were further analysed to interpret the apparent reason or motive behind across genders. In a study, a total of 1441 students have participated and the result shows that 696 (48.3%) were male and 745 (51.7%)

were female, meanwhile they were aged 17 -26 years. The results indicate that it is possible

to smartphone addiction which exists in 429 (29.8%) of the participants, these are all crucial

aspects of the rising prevalence of males (30.3%) and 29.3% in females. The study showed

females in older age, less use of calling and messaging and calling. In contrast, males in older

age will spend more time in smartphones' games, social media applications (Chen et al.,

2017). According to pervious study, several studies did not find significant gender differences

in smartphone addiction. A number of studies have examined the differences in smartphone

use between males and females. Females spend more time on the smartphone in contacting,

messaging to maintain the social relationship, by contrast, males use the smartphone for more

process-oriented as gambling usage and online gambling on the smartphone (Chen et al.,

2017). Besides, men have less self-control in technology as a smartphone (Lee et al., 2014).

Gender Differences in Sleep Quality

Based on the past study by Fahad (2016), it illustrates that sleep is important for a

human where it maintains and repairs the physical and cognitive functions in order to have

normal body activities, learning and memory. People need to have a maximum of eight hours

of sleep per day. However, the result by one research revealed that the majority of students do

not get their eight hours of sleep where 70.6 percent of college students reported sleeping less

than eight hours. These causes the students are susceptible to sleep-related problems and

health problems such as cardiovascular diseases, poor memory, depression, and more. In

addition, sleep deprivation happens because of technological gadgets where the National

Sleep Foundation found that 98.25 percent of adolescents at least have one technological

device and 53 percent have three technological devices with them in their bedroom. At the

same time, a study found that 90 percent of adolescents utilize their technological gadgets

like mobile phones, laptops or computers and television before bedtime. There is a significant

association between technological devices and sleep where it has been reported the usage of

technological gadgets affects the sleep of a person. This study was conducted with 643 respondents. The results proposed that about 60.5 percent of the participants claimed to have poor sleep quality, and the sleep duration for 71.8 percent of the participants was less than seven hours. The average sleep duration of the particular during weekdays and weekend are 6.82 and 8.73 respectively. Furthermore, it explained that 52.5 percent of males enter their bedroom between 9 pm to 12 am approximately compared to 46.1 percent females. From this study, it has been manifested that there was a relationship found between mobile phones and sleep (Fahad et al., 2016)**.**

Chapter III

Methodology

Research Design

The present study is a quantitative study where it quantifies smartphone addiction among undergraduate students based on the predictors. In the present study we use questionnaires by distributing it through an online survey (Qualtrics) to collect the data from undergraduate students whose ages range from 18 to 24 years old. A cross-sectional study was implemented to analyses the data from a population. This study measures the risk factors and outcome of the participants at the same time, also scrutinize the relationship between two variables, namely the smartphone addiction and sleep quality. Besides, the present study is the fast and low cost where it provides details about the negative consequences from the smartphone addiction that influence the sleep quality among undergraduate students population. At the same time, this research design will be applicable to use in collecting data within a large number of participants.

Sampling Technique

Sample size. This study used G-Power to evaluate the sample size with the expected effect size, f^2 =0.32, statistical power level of 0.95 and error probability level of 0.05. The numbers of predictors were inserted as one which is smartphone addiction. Besides that, based on the G Power sample size calculator, we found out that, the sample size for this study is 36 but to get a more accurate result and avoid some issues in the raw data such as not truthful answers and incompatible data, because of that we are aimed to get more than 150 participants in the present study.

Participants. Approximately 207 responses were collected in this study, after the data cleaning, a final valid of 176 responses were retained. In the present study, it involves 61 males (34.7 percent) and 115 females (65.3 percent). The data has been collected from the

respondents who were aged between 18 to 26 years old. Besides, most of the respondents were Chinese which was 153 (86.9 percent), followed by Indian was 19 (10.8 percent), Malay was 2 (1.1 percent) and others were 2 (1.1 percent) namely, Siamese and Mauritian.

Furthermore, most of the respondents are from Year 1 which was 70 (39.8 percent), followed by Year 2 was 41 (23.3 percent), Year 3 was 51 (29.0 percent) and others were 14 (8.0 percent) which consists of Year 4 and Postgraduate. Besides, Faculty of Arts and Social Science (FAS) which was 63 (35.8 percent) which indicate the highest respondents among the other faculty, Faculty of Business and Finance (FBF) was 43 (24.4 percent) Faculty of Information and Communication Technology (FICT) was 27 (15.3 percent), Faculty of Science (FSC) was 28 (15.9 percent), Faculty of Engineering and Green Technology (FEGT) was 9 (5.1 percent) and Institute of Chinese Studies (ICS) was 6 (3.4 percent). Last but not least, all the respondents claimed that they owned a smartphone.

Sampling method. In the current study, a total of 207 responses were obtained using an online survey nonetheless, 176 responses were maintained after data cleaning and removing outliers. The respondents were recruited to engage in the study using convenience sampling. It was a non-probability sampling method where respondents were chosen non-randomly to recruit in the research as they had equal chances and it is more comfortable to collect the data from the participants, also it is achievable easily and quickly (Jupp et al., 2011). This sampling method required less time and cost to gather participants' responses. According to Etikan, Musa & Alkassim (2016), convenience sampling is a sampling that easies to access through the internet since target respondents were accessible, geographically proximate, accessibility at a given time and different place (Etikan et al., 2016). Therefore, the researchers were able to collect responses from respondents who were pursuing studies at different universities in a short period instead of visiting universities to collect data of respondents.

Research Location

The study will be conducted at UTAR Kampar Campus which allocated in Perak, an education institution with a large undergraduate student population of more than 15,000 students. The students come from different states and parts of Malaysia. As the undergraduate students are the targeted population for this research, young adults who are currently pursuing their studies in UTAR Kampar often depend on their smartphones in everyday, they may contribute their information which associated to the research of correlation between smartphone addiction and sleep quality among undergraduate students which is reconciled by the intention of the usage of the smartphone.

Pilot study

In our current study, a pilot study was administered as an advance to the actual study. The pilot study was performed to measure the reliability of the instruments that we used in the study in the Malaysian context. Approximately, 48 responses were being included in the pilot study, but 12 respondents were eliminated from the pilot study cause of incomplete responses. Besides, approximately a number of 36 participants were being involved in the pilot study.

Research procedure

An online questionnaire was created using Qualtrics link and distributed to universities from public and private universities in Malaysia using the anonymous link and "QR code". We will be sending the link personally to our friends in UTAR campus for data collection by sharing it through "Facebook Messenger", "WhatsApp". Also, we informed to the respondents who have participated and completed the survey of our present study to circulate the link to their other friends in UTAR campus. Besides, we also use "QR code" to collect responses from UTAR undergraduate students by requesting them to scan the "QR code" to participate in the actual study. The questionnaire constructed of an informed consent

form, demographic information, and education level. For the respondents who agreed with

the terms and conditions and willing to participate in the research, they will be asked and

required to click on the "I agree to the participant" button. Thus, they will be asked to

complete the online questionnaire. However, if respondents had found any inquires, they may

contact our group leader through email.

Instruments/Questionnaires

   Two instruments were used in the current study to scrutinize the association between

the smartphone addictions and sleep quality. Besides, these two instruments evaluate the

degree of smartphone addiction followed by the quality and pattern of sleep. There were eight

questions have been created to acquire demographic information from the participants.

   Demographic Information. Demographic information of participants was attained

by posing the respondents with three open-ended questions which are age, sleep duration and

spending hours on smartphone in a day, followed by five close-ended questions which are

gender, ethnicity, faculty, year of study and ownership of a smartphone in the first section of

the questionnaire. Age will be the first element to answer by the participants followed by the

subsequent questions that involved gender, ethnicity, faculty, year of study, occupancy of a

smartphone, sleep duration and spending hours on smartphone in a day. The participants need

to fill up the blank space for open-ended questions and tick the answer for the close-ended

questions.

   Smartphone Addiction Inventory (SPAI) scale. This scale is generated by Lin et

al. (2014). This scale consists of 26 items be composed of four different subscales which are,

compulsive behavior, functional impairment, withdrawal and tolerance to the smartphone

where this scale was generated to determine the smartphone addiction level. The items are

measured using a 4-point Likert scale (''1=strongly disagree'', "2=somewhat disagree",

"3=somewhat agree", and "4=strongly agree"). Besides, the total summed up items will be

computed to get the final score. The final score will range from 26 to 104 and the higher score shows a high level of smartphone addiction. This scale recorded Cronbach's Alpha of 0.94 whereas the test-retest reliability of the total score and the subscales ranged from 0.80 to 0.91 (Lin et al., 2014).

Sleep Quality Scale (SQS). This scale was developed by Yi (2006). This scale consists of 28 items in total where it measures sleep quality. Besides that, Sleep Quality Scale analyze six domains of sleep quality which are daytime symptoms, restoration after sleep, problems initiating and maintaining sleep, difficulty walking and sleep satisfaction. The items are measured using a 4-point Likert scale ("0=few", "1=sometimes", "2=often", and "3=almost always"). Additionally, two domains which are restoration after sleep and satisfaction with sleep will be analyzed as reversed score before being tallied. The total score ranges from 0 to 84 and the higher scores exhibit reduce more severe sleep problems. This scale has been recorded Cronbach's Alpha as 0.92 while the test-retest reliability was displayed as 0.81 (Yi et al., 2006).

Data Cleaning

In the present study, a total of 207 responses were collected. At first, 26 cases were excluded due to incomplete answers (missing data). A further analysis was performed to identify the outliers and a total of 5 cases were removed at this stage. After excluding the outliers, a final of 176 responses were obtained for further data analysis.

Data Analysis Plan

Data analysis will be performed after the data collection process has been completed. The data will be infused into Statistical Packages for Social Science (SPSS) to run the analysis to identify the descriptive statistics, namely the mean and standard deviation, frequency for descriptive statistics and determine the outliers through screening to examine the demographic information and the total scores from Smartphone Addiction Inventory

(SPAI) scale and Sleep Quality (SQS). Besides, the correlation coefficient will be evaluated to identify the inferential statistics by performing Pearson Correlation Coefficient to answer the first research question to scrutinize the association between smartphone addictions and sleep quality. Independent sample T-test was applied in our study to answer the second research question, where it analyses the gender differences in smartphone addiction and sleep quality. Besides, the minimum and maximum range for each scale were calculated to determine the range of high, medium and low for each scale. This significance level for the findings was fixed to be less or equal to 0.05, cause of the significance level for hypothesis test which the P value less than or equal to alpha (α) is considered as statistically significant and the significance values are 0.1, 0.05 and 0.01. Besides, the P value less than or equal to 0.05 is used in the present study to correspond to the probability of making Type I error (Moore et al., 2013).

Normality's assumption consisted of Skewness and Kurtosis. Skewness identifies the measure of the symmetry of distribution around its mean whether it is positively skewed or negatively skewed in the statistics meanwhile kurtosis identifies the relevance about the distribution's dimensionality to a normal distribution (Čisar et al., 2010). In addition, +2 and -2 are the values attained for Skewness and Kurtosis in order to support normal univariate distribution (George et al., 2010). Besides, the quantile-quantile (Q-Q) plot can be referred for distributional evaluation in those univariate tests (Wilk et al., 1968). Q-Q plots also can be compared directly from a distribution to another distribution and so support visualized assessment of values obtained exists with other distribution to check the normality of statistics (Oldford, 2016). However, the Kolmogorov -Smirnov (K-S) test and Shapiro – Wilk test (S-W) can be administrated to determine from some specified continuous distribution (Lilliefors, 1967).

In addition, in the pilot study the reliability test was conducted and it has been found that both instruments have a higher reliability value, where the alpha Cronbach's coefficient for smartphone addiction inventory (SPAI) scale was (α = .93), followed by the alpha Cronbach's coefficient (α = .86) for sleep quality scale (SQS). The reliability of the pilot study and the actual study was shown in Table 3.1.

Besides, in the actual study the result shows that the instruments were highly reliable in the reliability test where the alpha Cronbach's coefficient (α = .89) for the smartphone addiction, followed by the alpha Cronbach's coefficient for the sleep quality was (α = .94). The reliability of the pilot study and the actual study was shown in Table 3.1.

Table 3.1

Reliability of the Instrument

Variable	No. of Items	Cronbach Alpha		
		Past study	Pilot study	Actual Study
Smartphone Addiction Inventory	26	.94	.935	.896
Sleep Quality Scale	28	.81	.864	.940

Chapter IV

Findings and Analysis

Normality Assumptions

      Univariate outliers. Initial analysis that has been conducted for the actual study where the normality assumptions were checked through P-P plot, Q-Q plot, Kolmogrov Smirnov and Shapiro Wilk, histogram and skewness and kurtosis.

      Skewness and kurtosis. In the present study, skewness and kurtosis were used to examine the normality distribution. Table 4.1 revealed that with a total of 176 samples, there is no violation of the skewness and kurtosis assumption, where the values were within the acceptable range of -2 to +2 (George et al., 2010).

Table 4.1

Skewness and Kurtosis Table

	Skewness	Kurtosis
Total score of SPAI	-.140	-.336
Total Score of SQS	.294	-.280

Note. SPAI = Smartphone Addiction Inventory, SQS = Sleep Quality Scale.

      Histogram. The normality of the scales was recognized through histogram where the result indicates that smartphone addiction was negatively skewed, whereas sleep quality was found positively skewed.

      Normal Q-Q plot. The Q-Q plot is an indicator for test of normality. The Q-Q plot reveals that the data was normally distributed where the data points were closed to the diagonal line for the smartphone addiction and sleep quality.

      Normality test. The Kolmogrov Smirnov and Shapiro Wilk test were utilized to analyze the normality for the actual study. According to the Ghasemi and Zahediasl (2012), explained that if the p-value is greater than 0.05, it reveals that the normal distribution

(Ghasemi et al., 2012). Table 4.2 reveals the result of Kolmogrov Smirnov and Shapiro Wilk

for the actual study where it displays the significant value with the Kolmogrov Smirnov test

of normality for smartphone addiction and sleep quality.

Table 4.2

Kolmogorov- Smirnov and Shapiro-Wilk Table

	Kolmogorov- Smirnov	Shapiro-Wilk
Total score of SPAI	.200*	.295
Total Score of SQS	.200*	.044

Note. SPAI =Smartphone Addiction Inventory, SQS = Sleep Quality Scale

Descriptive

Background of Respondents

The demographic information of the respondents was showed in Table 4.3. There are

176 participants from 18 to 26 years old, gender (M =1.65, SD =0.48), ethnicity (M =2.12, SD

=0.39), faculty (M =2.40, SD =1.42) and year of study (M = 2.05, SD =1.004). The highest

percentage of 23.9% age group were 21 years old (n = 42), 22.7% were 20 years old (n = 40),

19.9% were 23 years old (n = 35), 11.9% were 22 years old (n =21), 10.2% were 24 years old

(n =18), 19 and 25 years old were 5.1% respectively (n = 9) while 18 and 26 years old were

0.6% (n =1). However, more than half of the respondents in which 65.3% were female

respondents (n =115) while 34.7% were male respondents (n = 61). Most of the partcipants in

the present study were Chinese where the result shows 86.9% (n =153), followed by 10.8%

were Indian (n = 19), 1.1% were Malay (n = 2) and 1.1% also from other ethnicity group (n =

2). Besides, the most number of respondents of this study, 35.8% were FAS (n = 63), 24.4%

were FBF (n = 43), 15.9% were FSc (n = 28), 15.3% were FICT (n = 27), 5.1% were FEGT

(n = 9) and 3.4% consists of the least number of respondents in ICS (n = 6). Last but not

least, 39.8% of the respondents were Year 1 students (n = 70), 29% were Year 3 students (n =

51), 23.3% were Year 2 students ($n = 41$) and the rest 8% were in other year of study ($n = 14$).

Table 4.3

Descriptive of Respondents

Demographic profile	Frequencies (n)	Percentage (%)
Age		
18	1	0.6
19	9	5.1
20	40	22.7
21	42	23.9
22	21	11.9
23	35	19.9
24	18	10.2
25	9	5.1
26	1	0.6
Gender		
Male	61	34.7
Female	115	65.3
Ethnicity		
Malay	2	1.1
Chinese	153	86.9
Indian	19	10.8
Other	2	1.1
Faculty		

FAS	63	35.8
FBF	43	24.4
FICT	27	15.3
FSc	28	15.9
FEGT	9	5.1
ICS	6	3.4
Year of Study		
Year 1	70	39.8
Year 2	41	23.3
Year 3	51	29.0
Others	14	8.0

Frequency Distribution

Table 4.4 exhibits the mean score for both variables which are smartphone addiction

and sleep quality. The mean scores for total scores of smartphone addiction is 62.40 ($SD =$

11.40), followed by the mean scores is 50.43 ($SD = 17.90$) for the total scores of sleep

quality.

Table 4.4

Frequencies distribution of Total Score of SAS and SQS (N=176)

Variable	*M*	*SD*	Min	Max
Smartphone Addiction	62.40	1.40	34.00	94.00
Sleep Quality	50.43	7.90	15.00	101.00

Note. M: Mean; *SD*: Standard Deviation; Min: Minimum Score; Max: Maximum Score

Inferential Analysis

In this part, the analyses of Pearson's Correlation Coefficients and Independent-

Samples T-Test were conducted based on the research questions of the present study.

RQ1: The significant relationship between smartphone addiction and sleep quality

H1: There is a significant relationship between smartphone addiction and sleep quality.

Table 4.5 revealed the result of Pearson's Correlation Coefficients between the predictor and outcome variable namely smartphone addiction and sleep quality. The result demonstrates that there is a positive significant relationship between smartphone addiction and sleep quality, $r (176) = .176$, $p <.020$. Besides, the smartphone addiction and sleep quality have a low association. Thus, the null hypothesis is rejected.

Table 4.5

Pearson Correlation of Smartphone Addiction and Sleep Quality

		Sleep Quality
Smartphone Addiction	Pearson's Correlation	.176*
	Sig. (2 tailed)	.020
	N	176

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

RQ2: The significant gender difference in smartphone addiction among undergraduate students in UTAR?

H2: There is a significant gender difference in smartphone addiction among undergraduate students in UTAR

The result below indicates the gender difference in smartphone addiction among UTAR undergraduate students. The second hypothesis of the actual study was there is a significant gender difference in smartphone addiction among UTAR undergraduate students. Besides, an independent-sample t-test was executed to test the differences in smartphone addiction between males and females. As depicted from Table 4.6, there is no significant

gender difference, $t(176) = -.059$, $p = 0.953$. The mean smartphone addiction score for male

($M = 62.33$, $SD = 12.24$) was slightly lower than the mean for female ($M = 62.43$, $SD =$

10.98). This illustrates that both males and females have the same level of smartphone

addiction. Therefore, the null hypothesis is failed to reject.

Table 4.6

Independent Sample T-test of Total Score of SPAI

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal Variance Assumed	.335	.563	-.059	174	.953	-.107	1.81

RQ 3: The significant gender difference in sleep quality among undergraduate students in UTAR?

H3: There is a significant gender difference in sleep quality among undergraduate students in UTAR

An independent-sample t-test was performed to analyze the gender differences in sleep quality among UTAR undergraduate students. The third hypothesis was proposed as there is a significant gender difference in sleep quality among UTAR undergraduate students. As interpreted from Table 4.7 there is no significant gender difference in sleep quality, $t(176)$ = -.303, $p = 0.762$. Mean sleep quality score for males was ($M = 49.87$, $SD = 19.28$) was slightly lower than the mean sleep quality score for females ($M = 50.73$, $SD = 17.21$), it explained that male and female have a similar level of sleep quality. Thus, the null hypothesis is failed to reject.

Table 4.7

Independent Sample T-test of Total Score of SQS

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	*t*	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal Variance Assumed	.244	.622	-.303	174	.762	-.862	2.84

Chapter V

Discussion and Conclusion

H1: The relationship between smartphone addiction and sleep quality.

The present study has supported the first proposed hypothesis, where the results exhibited that there is a positive significant correlation between smartphone addiction and sleep quality. Throughout thus result, can be demonstrated that the higher the level of smartphone addiction, the higher the tendency to have poorer sleep quality.

Besides, the present study findings were consistent with past study which Nahla (2018), illustrates that people face sleep quality problems due to smartphone addiction which affects their focus, concentration and their academic performances. Based on the past study results, it has been claimed that students have a poor sleep quality, cause of addiction to the smartphone, where the students reported that they sleep for six hours per day. In addition, past study indicates that the students utilize their smartphone for more than five hours per day. This is because students get attracted with new smarty features and functions that provide convenient and easy life. Students can access internet, social network, paly online games, music, movies and more very easily at one place. Next, it has been demonstrated that students use their smartphone for a longer duration to communicate with other people namely, family members, friends, colleagues, teachers or lecturers, assignment group mates and more rather than having a face-to-face communication. Hence, this past study revealed that smartphone addiction has a significant relation with poor sleep quality (Nahla et al., 2018).

In addition, the present study results are similar to a study by Tao (2017), where this study emphasizes smartphone addiction have a high risk on facing depressive disorders and poor sleep quality. This past study evaluate the association between the smartphone use and psychological symptoms among college students where it has been claimed that people who

use their smartphone at night have faced some problems due to severe disturbing exposure and shortwave light form smartphone that cause the person to have a failure in their circadian timing system which leads to sleep disorders and depressive symptoms. Thus, this past study shows that increase level of excessive smartphone use has been correlated with poorer sleep quality (Tao et al., 2017).

Moreover, the current study findings are also supported by a pervious study by Mehrnaz (2017), in which the study explained that smartphone use leads to sleep quality problems. This is because people tend to check their smartphone repetitively and get obsessive with the smartphone's extraordinary functions that cause them to feel distress without the smartphone and reduce the social interaction also decrease the academic achievement. Besides, this previous study illustrates that smartphone addiction leads to physical-health related issues where it reduce the Rapid Eye Movement (REM) which occur during one's dream and the sleep efficiency of a person. People are suffering from sleep disturbance or sleeping problems due to the light emission from the smartphone. This is because the radiations from the light emission of the smartphone cause the person unable to sleep or stay awake for the whole night. To conclude, this previous study stated that there is relation between smartphone addiction and sleep quality (Moattari et al., 2017).

H2: The significant gender differences in smartphone addiction among undergraduate students in UTAR.

The independent t – test display there is no significant gender differences in smartphone addiction among UTAR undergraduate students, which mean both males and females, have a same level of smartphone addiction. The past study has discovered that the gender did not vary significant in smartphone addiction, where the males were more likely involved themselves in smartphone' games, social media applications but females tend to involve themselves in contacting, messaging to maintain a social relationship (Chen, 2017).

Thus, according to Kwon (2013), there are no significant gender differences in smartphone addiction which recorded on validation of Smartphone Addiction Scale scores (Kwon et al., 2013). According to Alhassan (2018), gender differences were not identified in smartphone addiction in this study. This study reported that boys more likely to utilize smartphone for entertainment meanwhile girls tend to utilize smartphone for socializing purposes, the addictive level differs for males and females dependent on smartphone (Alhassan et al., 2018).

However, the results of gender differences in smartphone addiction were inconsistent. Moreover, there are two different results have been reported due to the gender differences in smartphone addiction. Several studies showed girls were more likely to rely on smartphone than boys (Chiu et al., 2013; Choi, et al., 2015; Park et al., 2014). Other than that, according to Park and Lee (2014), boys and girls tend to use smartphone for a different purpose in daily functioning. The study has been reported that females are more likely to involve themselves in socializing and contacting but boys tend to use smartphone for gaming purposes (Park et al., 2014). Last but not least, we considered that both boys and girls tend to use smartphone for different purposes and needs but they can be the same to each other in the smartphone additive level. According to Choliz (2012), females score higher on the overuse of smartphone than males they were more likely to involve themselves dependent on smartphone to avoid negative emotions (Choliz, 2012). A prior study defined females dependent on smartphone are higher than males meanwhile males more likely to involve themselves in technological media time than females (Devis et al., 2009).

H3: The significant gender differences in sleep quality among undergraduate students in UTAR.

The independent t-test reveals there is no significant gender difference in sleep quality among UTAR undergraduate students, both males and females have the same level of sleep

quality.

Several studies showed there is a significant gender difference in having poor sleep quality. As stated by Fatima (2016), females discovered to have lower sleep quality than males. This study presented lower sleep quality in young females than males, this may be caused by psychosocial differences and environmental factors (Fatima et al., 2016). Gender differences in poor sleep quality have been found in the aged group (Luo et al., 2013). However, several researches reported that gender differences in young adults which tend to perform in sleep quality (Hung et al., 2013). Females tend to face poorer sleep quality normally with older age group, mostly the causes of poor sleep quality can be happened to the primacy of affective disorders and socioeconomic differences, specifying that those could be the factors though gender differences in bad sleep quality presented (Bruck et al., 2012; Arber,et al., 2009; Sekine et al., 2006).

Besides, according to a study, there is no significant gender difference in sleep quality, this may be caused by negative effects of daily life and relevant to aspects of healthy and quality life during their time in pursuing their studies (Angelone et al., 2011). According to Buysse (1989), there was no significant gender difference in sleep quality among young adults. However, discussing a path of support on morphologic dissimilarities between males and females in physiological condition, sex hormones' situation and respiratory regulation on sleep mechanism that influence the sleep quality across gender (Buysse et al., 1989).

Implications

Theoretical Implication. This study could present to the public by sharing contextual information on smartphone addiction and sleep quality. Scant past studies had been completed in other country contexts. However, there are limited studies in Malaysia. The current study recorded that smartphone addiction was a positive significant predictor towards sleep quality, whereas gender differences were non-significant predicts to both smartphone

addiction and sleep quality. Therefore, the current study able to present a broader research perspective in this relevant field in the Malaysia context. Nevertheless, this study may help in contributing substantial knowledge for further study.

Practical Implication. The current study provides a better insight into the correlation between smartphone addiction and sleep quality among undergraduate students. As for the undergraduate students, they must experience a period of pressure in learning, rushing for assignments and examinations, trouble for a social relationship with friends, they may neglect the quality of sleep. However, poor sleep quality will affect academic performance, concentration in learning, emotional regulation and physical health. Moreover, this study provides a clearer awareness of the positive association between smartphone addiction and sleep quality among undergraduate students. Furthermore, related parties concerned could acquire information by referring to carry out beneficial workshops and programs, counseling sessions, raise awareness and prevention against smartphone addiction among undergraduate students in Malaysia. Apart from that, mental health experts may implement psycho education for smartphone addiction from session to session and help to reduce the usage of smartphone to improve the sleep quality among undergraduate students.

Limitations

In the present study, there a few limitations that can be addressed. Firstly, larger numbers of respondents in the present study are Chinese compared to other races, which cause the result cannot be generalized due to the lack of respondent from other races. As a result, this could create potential biases. Nevertheless, the fact that the maximum students in UTAR Kampar campus are Chinese.

Besides, in the current study the questionnaires were self-reported. In such situations, the respondents may provide biased answers cause the respondents could be under social pressure where they need to follow their social norms in order to answer the

questions (Lavrakas, 2008). This lead to a problem in the aspect of accuracy. This is because the respondents may not answer the question with honesty, which cause to have an inconsistent result.

Furthermore, the survey distribution method posed another limitation in the current study. In the present study, the Qualtrics survey method was used to obtain data from UTAR undergraduate students. A survey "QR code" was generated from the Qualtrics link to distribute the questionnaire to the students. This method could be an easy and convenient way to collect the responses, but not everyone would have the "QR code" scanner in their mobile phone to scan the "QR code" or may have a poor internet network, this cause the respondents unable to participate in the actual study. As the result, there will be fewer amounts of respondents in the present study.

Last but not least, the current study was conducted using 176 respondents which are considered as scenario scale of UTAR undergraduate students, whereas the total number of students in the UTAR Kampar campus is approximately 15 000. This is because the respondents attempted to the survey, but quit the survey in halfway, which cause incomplete answers and missing value in the raw data set. Approximately 26 cases were removed due to incomplete answers. As a consequence, there will be lacking respondents that may create inconsistent results in the actual study.

Recommendations

Regarding the limitations in this actual study, future researchers are encouraged to increase the number of respondents to obtain a consistent result. This is because the reliability and validity can be upgraded by increasing the sample size. Next, it also motivates the future researcher to expand the population Roma larger geographical area instead of focusing on the particular population for the future study.

In addition, future researchers need to be ensuring that the amounts of respondents

need to be equal in terms of gender and race by performing a diverse sampling. This may provide a fair and unbiased data. Besides, future researchers need to consider and approach other respondents from a different field, programs, faculty or department instead of focusing on the same or one particular field, program, faculty or department. This is because it may avoid bias responses.

Next, future researchers are encouraged to use other survey methods instead of Qualtrics link and "QR code" to collect the responses for their future studies. Additionally, the suggestion for future researchers is the may use the paper-pencil survey method in order to avoid the incomplete answers or missing data. The paper pencil survey method may help future researchers to obtain more participants and get more truthful answers without any bias responses from the participants.

Conclusion

To conclude, past studies have provided evidence and supports the aspect of smartphone addiction and sleep quality. The current study has achieved the objective of discovering smartphone addiction as the predictor of sleep quality among UTAR undergraduate students. The actual study was aimed to explore the correlation between smartphone addiction and sleep quality followed by the gender differences in smartphone addiction and sleep quality. Besides, the findings revealed that smartphone addiction was a significant predictor of sleep quality. Also, the present study has established that there is no significant gender difference in smartphone addiction and sleep quality among UTAR undergraduate students. Future researchers are encouraged to examine this study in order to get better insights by exploring more on this topic.

Throughout this actual study, the findings have given insights into the seriousness of having poor sleep quality due to smartphone addiction. Thus, the actual study can be a guide for the future researchers to carry out in-depth exploration on this topic, also we believed

and hoped that the actual study contributes some awareness and details or facts to the

society regarding the smartphone addiction, also the sleep quality problems caused by the

smartphone addiction, which lead to several problems in terms of mental, physical,

emotional, behavioral, psychological and more among the people in the world.

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Appendices Appendix A: Turnitin Report

FINAL YEAR PROJECT 2

ORIGINALITY REPORT

19%	6%	6%	18%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Universiti Tunku Abdul Rahman Student Paper	4%
2	Submitted to City University of Hong Kong Student Paper	2%
3	eprints.utar.edu.my Internet Source	2%
4	Submitted to College of Professional and Continuing Education (CPCE), Polytechnic University Student Paper	1%
5	Submitted to Nottingham Trent University Student Paper	1%
6	lib.dr.iastate.edu Internet Source	1%
7	Submitted to RMIT University Student Paper	1%
8	Submitted to Glasgow Caledonian University Student Paper	<1%

Appendix B1: Demographic Information

Q5. Part A-Demographic information

Q6. Age

Q7. Gender

Male

Female

Q8. Ethnicity

Malay

Chinese

Indian

Others

Q9. Faculty

FAS

FBF

FICT

Appendix B2: Smartphone Addiction Inventory Scale

Q14. Section A: How frequently do you use smartphone?

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

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

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

○ Strongly Disagree

○ Somewhat Disagree

○ Somewhat agree

○ Strongly agree

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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. ⌄

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

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

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

25. I cannot have meal without smartphone use. ⌄

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

→

Appendix B3: Sleep Quality Scale

Q15. **Section B: Sleep Quality Scale**
The survey is to know the quality of sleep you had for the last one month. Read the
questions and check the closest answer.

0 Rarely : None - 1-3 times a month
1 Sometimes : 1-2 times a week
2 Often : 3-5 times a week
3 Almost always : 6-7 times a week

1. I have difficulty falling asleep. ⌃

○ Rarely

○ Sometimes

○ Often

○ Almost always

2. I fall into a deep sleep. ⌄

3. I wake up while sleeping. ⌄

4. I have difficulty getting back to sleep once I wake up in middle of the night. ⌄

5. I wake up easily because of noise. ⌄

6. I toss and turn. ⌄

7. I never go back to sleep after awakening during sleep. ⌄

8. I feel refreshed after sleep. ⌄

9. I feel unlikely to sleep after sleep. ⌄

10. Poor sleep gives me headaches. ⌄

11. Poor sleep makes me irritated. ⌄

12. I would like to sleep more after waking up. ⌄

13. My sleep hours are enough. ⌄

14. Poor sleep makes me lose my appetite. ⌄

15. Poor sleep makes me hard to think. ⌄

16. I feel vigorous after sleep. ⌄

17. Poor sleep makes me lose interest in work or others. ⌄

18. My fatigue is relieved after sleep. ⌄

19. Poor sleep causes me to make mistakes at work. ⌄

20. I am satisfied with my sleep. ⌄

21. Poor sleep makes me forget things more easily. ⌄

22. Poor sleep makes it hard to concentrate at work. ⌄

23. Sleepiness interferes with my daily life. ⌄

24. Poor sleep makes me lose desire in all things. ⌄

25. I have difficulty getting out of bed. ⌄

26. Poor sleep makes me easily tires at work. ⌄

27. I have a clear head after sleep. ⌄

28. Poor sleep makes my life painful. ⌄

→

Appendix C: Effect Size

Section A: R^2 value of Smartphone addiction and Sleep Quality

mean of mindfulness. Similarly, the conditional indirect effect analysis was to test the effects of mobile phone addiction on sleep quality through the mediation of rumination at the mean of mindfulness as well as plus and minus one standard deviation from mean of mindfulness. As can be seen from the mediator variable model ($F = 92.55$, $R^2 = 0.32$, $p < 0.001$) and dependent variable model ($F = 60.03$, $R^2 = 0.32$, $p < 0.001$), after controlling for gender and grade, mobile phone addiction positively predicted rumination ($\beta = 0.23$, $p < 0.001$), rumination positively predicted sleep quality ($\beta = 0.28$, $p < 0.001$), and mobile phone addiction positively predicted sleep quality ($\beta = 0.13$, $p < 0.001$). These results indicated rumination partially mediated the relationship between mobile phone addiction and sleep quality. Therefore, H1 was supported. Besides, the interaction of mobile phone addiction and mindfulness showed significant effects on sleep quality ($\beta = -0.19$, $p < 0.01$) and rumination ($\beta = -0.15$, $p < 0.001$). These findings indicated both the association between mobile phone addiction and sleep quality and the association between mobile phone addiction and rumination were moderated by mindfulness (see Figure 2 and Figure 3). Furthermore, as can be seen from the conditional direct effect analysis and conditional indirect effect analysis, two of the three conditional direct effects (based on the moderator values at the mean and at -1 standard deviation) and two of the three conditional indirect effects (based on the moderator values at the mean and at -1 standard deviation) were positively and significantly different from zero. Namely, the effect of mobile phone addiction on sleep quality and the indirect effect of mobile phone addiction on sleep quality through rumination

Section B: Total Sample Size calculated using G* power
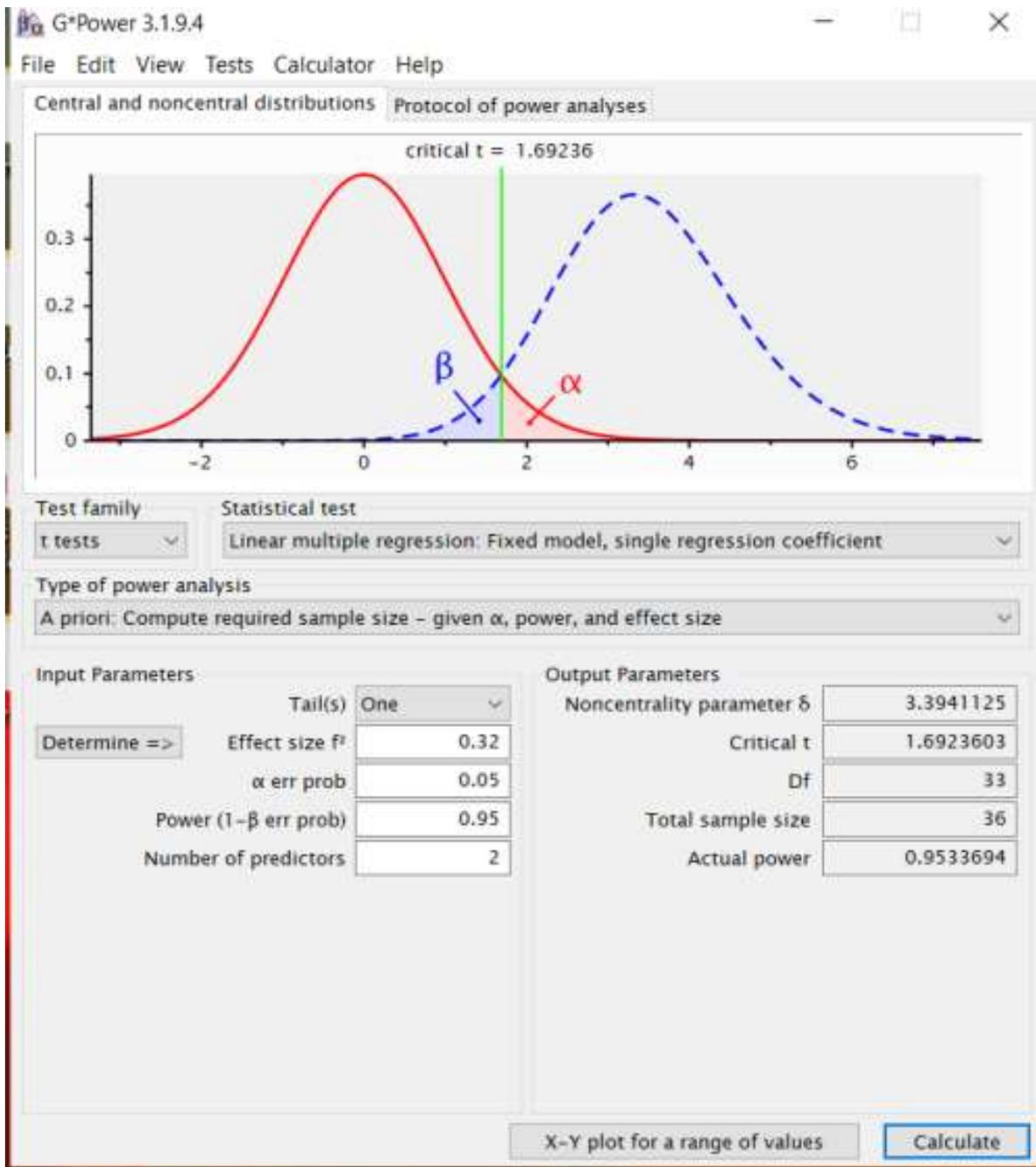
Appendix D: SPSS Results Reliability of the Scales

Smartphone Addiction Inventory Scale

Reliability Statistics

Cronbach's Alpha	N of Items
.896	26

Sleep Quality Scale

Reliability Statistics

Cronbach's Alpha	N of Items
.940	28

Appendix E: Normality Assumptions

P-P Plot

Total Score of SPAI

Normal P-P Plot of Total Score SPAI

Total Score of SQS
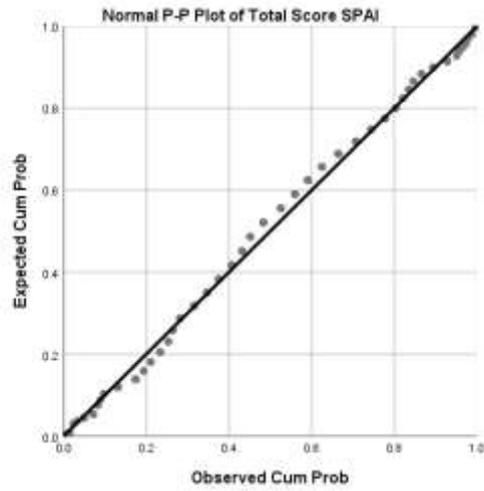
Normal P-P Plot of Total Score SQS
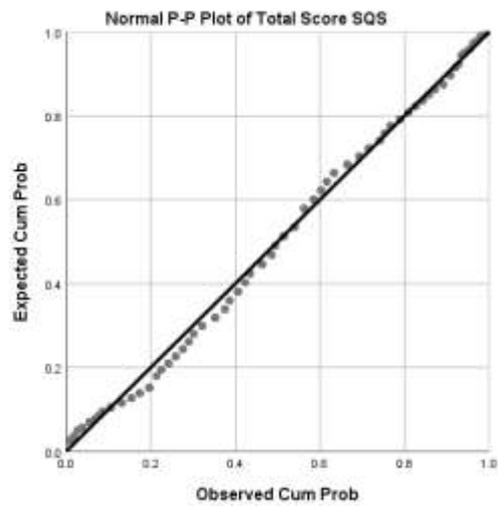
Q-Q Plot
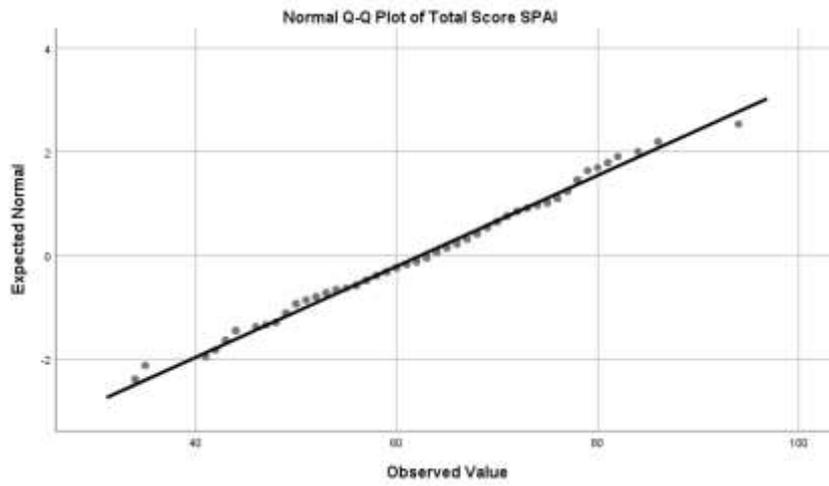
Total Score of SPAI
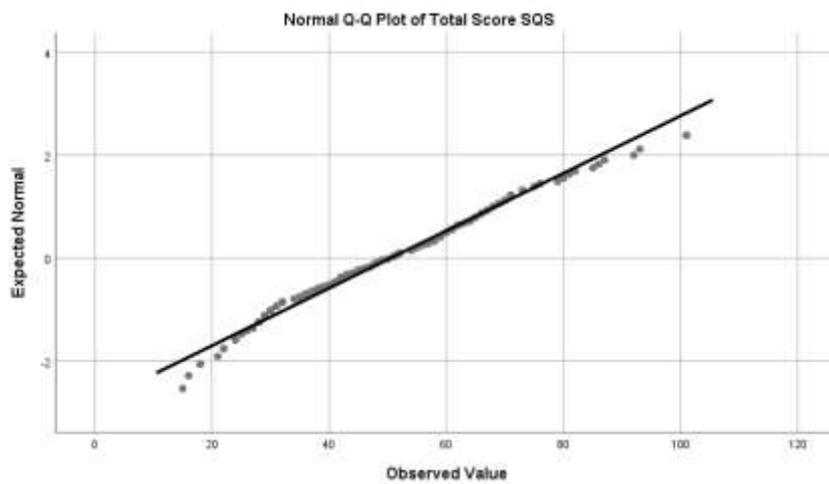
Total Score of SQS

Kolmogorov-Smirnov (K-S) Test and Shapiro-Wilk (S-W)

Total Score of SPAI and SQS

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Total Score SPAI	.061	176	.200[*]	.991	176	.295
Total Score SQS	.059	176	.200[*]	.984	176	.044

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Histogram

Total Score of SPAI
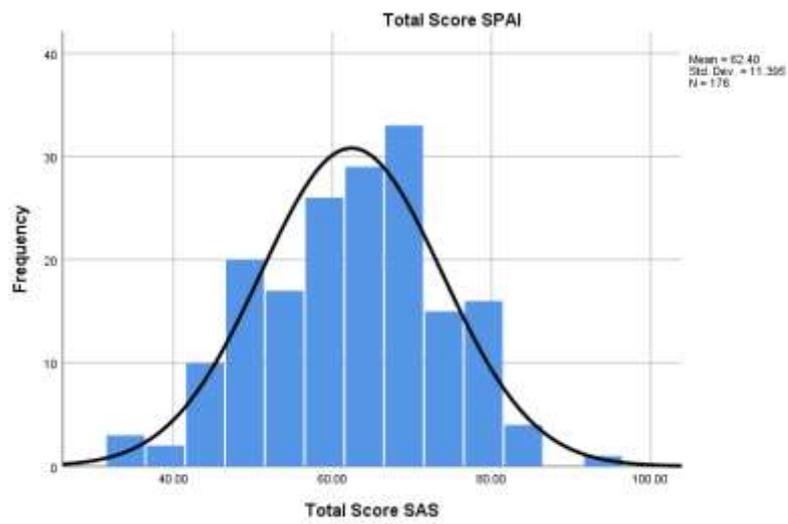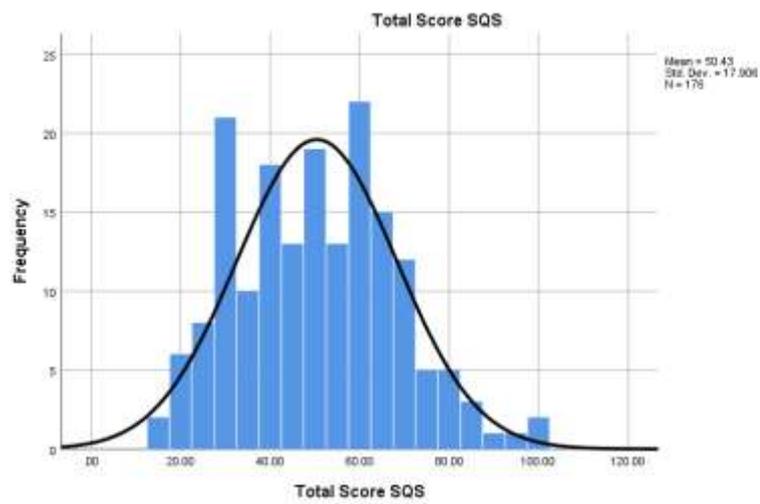
Total Score of SQS

Skewness and Kurtosis

Total Score of SPAI and SQS

Statistics

		Total Score SPAI	Total Score SQS
N	Valid	176	176
	Missing	0	0
Mean		62.3977	50.4318
Std. Deviation		11.39528	17.90565
Skewness		-.140	.294
Std. Error of Skewness		.183	.183
Kurtosis		-.336	-.280
Std. Error of Kurtosis		.364	.364
Minimum		34.00	15.00
Maximum		94.00	101.00

Appendix F: Descriptive Statistics

Statistics

		Age	Gender	Ethnicity - Selected Choice	Faculty	Year of Study - Selected Choice
N	Valid	176	176	176	176	176
	Missing	0	0	0	0	0
Mean			1.65	2.12	2.40	2.05
Median			2.00	2.00	2.00	2.00
Std. Deviation			.477	.389	1.415	1.004
Percentiles	25		1.00	2.00	1.00	1.00
	50		2.00	2.00	2.00	2.00
	75		2.00	2.00	3.00	3.00

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18	1	.6	.6	.6
	19	9	5.1	5.1	5.7
	20	40	22.7	22.7	28.4
	21	42	23.9	23.9	52.3
	22	21	11.9	11.9	64.2
	23	35	19.9	19.9	84.1
	24	18	10.2	10.2	94.3
	25	9	5.1	5.1	99.4
	26	1	.6	.6	100.0
	Total	176	100.0	100.0	

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	61	34.7	34.7	34.7
	Female	115	65.3	65.3	100.0
	Total	176	100.0	100.0	

Ethnicity - Selected Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Malay	2	1.1	1.1	1.1
	Chinese	153	86.9	86.9	88.1
	Indian	19	10.8	10.8	98.9
	Others	2	1.1	1.1	100.0
	Total	176	100.0	100.0	

Faculty

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	FAS	63	35.8	35.8	35.8
	FBF	43	24.4	24.4	60.2
	FICT	27	15.3	15.3	75.6
	FSc	28	15.9	15.9	91.5
	FEGT	9	5.1	5.1	96.6
	ICS	6	3.4	3.4	100.0
	Total	176	100.0	100.0	

Year of Study - Selected Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Year 1	70	39.8	39.8	39.8
	Year 2	41	23.3	23.3	63.1
	Year 3	51	29.0	29.0	92.0
	Others	14	8.0	8.0	100.0
	Total	176	100.0	100.0	

Appendix G: Independent Sample T - Test

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Total Score SPAI	Male	61	62.3279	12.23890	1.56703
	Female	115	62.4348	10.97695	1.02361
Total Score SQS	Male	61	49.8689	19.27734	2.46821
	Female	115	50.7304	17.21399	1.60521

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Total Score SPAI	Equal variances assumed	.335	.563	-.059	174	.953	-.10691	1.81012	-3.67953	3.46571
	Equal variances not assumed			-.057	111.447	.955	-.10691	1.87173	-3.81570	3.60187
Total Score SQS	Equal variances assumed	.244	.622	-.303	174	.762	-.86158	2.84356	-6.47389	4.75073
	Equal variances not assumed			-.293	111.035	.770	-.86158	2.94428	-6.69585	4.97268