THE RELATIONSHIP BETWEEN SMARTPHONE ADDICTION, INTERNET GAMING DISORDER (IGD), AND SLEEPING PROBLEM (INSOMNIA) AMONG YOUNG UNDERGRADUATE STUDENTS IN MALAYSIA

BY

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DECLARATION FORM

We hereby declare that all the material contained in this paper is the end results of our own work and due acknowledgment has been given in the bibliography and references to ALL sources they printed, electronic and personal.

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ABSTRACT

Insomnia is one of the major sleeping disorders that affect millions of people around the world, including Malaysia. Hence, the study aimed to find out the relationship between smartphone addiction, internet gaming disorder, and insomnia among the young undergraduates in Malaysia. There are three instruments that were used in this study to for the measuring of each respective constructs, which are Five-factor Smartphone Addiction Inventory short-form with 10 items (5FSPAI-SF), Internet Gaming Disorder Scale-Short Form (IGDS9-SF), and Insomnia Severity Index (ISI). The quantitative methodology and survey design of cross-sectional were applied for the study. We also apply purposive sampling method to collect respondent from young adults in Malaysia, aged between 18 – 26 years old, who were the major group of people that are affected by insomnia. 162 young adults from Malaysia have responded to the study by filling and answering the survey questionnaire. The results have shown that both smartphone addiction and internet gaming disorder have a positive relationship with insomnia. Both smartphone addiction and internet gaming disorder positively predicted insomnia. The current research not only illuminates new perspectives on insomnia among young undergraduates in Malaysia but also furnishes empirical evidence to policymakers for devising evidence-based programs that address Insomnia.

Keywords: Smartphone addiction, internet gaming disorder, insomnia, and young adults in Malaysia.

APPROVAL FORM

This research paper attached entitled. ‘The relationship between smartphone addiction, internet gaming disorder (IGD), and sleeping problem (Insomnia) among young undergraduate students in Malaysia” prepared and submitted by Leong Lerk Yung, Shin Bin Shyen and Liew Yee Hang in partial fulfilment of the requirements for the Bachelor of Social Science (Hons) is hereby accepted.

_____ Date: 10/4/2023

Supervisor: Dr. Ooh Seow Ling

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Abbreviations

1. APA	-	American Psychologist Association
2. IGD	-	Internet Gaming Disorder
3. DSM-5	-	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
4. WHO	-	World Health Organization
5. COVID-19	-	Coronavirus Disease 2019
6. U&G	-	Uses and Gratification
7. SPSS	-	Statistical Package for the Social Sciences
8. MLR	-	Multiple Linear Regression
9. 5FSPAI-SF	-	Five-factor Smartphone Addiction Inventory short-form with 10 items
10. ISI	-	Insomnia Severity Index
11. IGDS9-SF	-	Internet Gaming Disorder Scale-Short Form
12. SERC	-	Scientific and Ethical Review Committee

CHAPTER 1: INTRODUCTION

1.0 Chapter Overview

1.1 Research Background

Sleeping is very important in maintaining the lifestyle of an individual, especially for university students who need a lot of concentration and energy for their daily studies and activities. However, university students nowadays often face problems with sleeping, including bad sleeping quality, difficulty sleeping, insomnia and inability to rest well. Based on the statistics done by the faculty of Medicine and Health Science from University Putra Malaysia, over 70% of the students had poor sleeping quality in their university life (Khuan & Nurismadiana, 2018). Meanwhile, university students who are also young adults are also the largest group who need to take more than 30 minutes for them to fall asleep (Shaifullizan, 2019). Furthermore, based on a sleep deprivation survey done by Yuen et al (2021), 58.1% students have faced the problems of sleep deprivation in which they sleep less than 7 hours a day, much lower than the normal sleeping hour which is 7 to 9 hours. Besides that, by referring to the survey done by AmLife sleep survey 2018, 9 out of 10 Malaysian people are facing one or more sleeping problems. One quarter from the whole agree that the time they spend on gadgets is too much which leads to sleeping problems.

Nowadays, smartphone addiction has led to sleeping issues and poor sleep quality, which results in an unhealthy lifestyle (Wang et al., 2019). Smartphone is a device that can be used for any purpose and has numerous features that are comparable to those available on a computer. Smartphone addiction is characterized as a condition linked to unrestrained smartphone use. Smartphone addiction is a constant activity of using a mobile phone where the individual is unable to control the usage without being aware of the negative impacts that can cause numerous difficulties for the person (Cha & Seo, 2018). Seo (2018) said that a person's life may be disrupted by their desire to use a smartphone because it makes them happy. According to Statista (2019), there are approximately 18.4 million smartphone users in Malaysia. It is estimated that by 2019, there will be more than half a billion smartphone users worldwide. Due to apps, online activities, reading material, and online games that provide users a pleasurable experience, many become addicted to their smartphones. Smartphones make life more convenient, but they also have a detrimental influence on people worldwide since they have become an addiction for people at all stages of life. Randler et al (2016) stated that people who become addicted to smartphones are more likely to have a

range of negative consequences in terms of physically, psychologically, and mentally. In addition, smartphone addiction disrupts people's daily routines as they prefer to use their devices rather than sleeping early (Randler et al, 2016). Numerous problems show how smartphone addiction has altered a person's behavior and the most severe is causing sleeping problems which make it impossible to lead a regular life (Randler et al, 2016). Overusing smartphones has been linked to lower sleep length, prolonged sleep latency, and daytime sleepiness (Chung et al., 2018).

Technology advancements and the Internet's tremendous accessibility have both contributed to a sharp rise in internet usage. Furthermore, internet gaming has evolved into one of the most popular leisure activities throughout the world, and many appealing online multiplayer games have been invented and promoted in society recently (Harris, 2018). However, mental health experts have recognized that problematic gaming behavior is an addiction with clinical importance (Bueso et al., 2018). Statista (2018) reports that from 2005 to 2017, there were 1.02 to 3.58 billion Internet users globally. According to Department of Statistics Malaysia (2018), there are a total of 80.1% of active Internet users with 21% of Multiplayer Online Battle Arena (MOBA) gamers. Harris (2018) stated that in Malaysia, Mobile Legends topped the revenue rankings and ranks second in downloads only to PUBG Mobile. Malaysia has approximately 14 million gamers who spent a total of $587 million, ranking Malaysia 21st in the world in terms of gaming revenues (Newzoo, 2017). Therefore, the Diagnostic and Statistical Manual of Mental Disorders (DSM) expanded to include Internet Gaming Disorder (IGD) (DSM-5; American Psychiatric Association, 2013). The American Psychological Association (2013) states that diagnosis of IGD in clinical aspects is a pattern of behavior characterized by excessive and uncontrollable participation in online gaming. Resulting in considerable impairment or suffering over a 12-month period as shown by endorsing nine criteria which are obsessed with online games, dissociative symptoms when online games is discontinued, acceptance deriving in the desire to greater amount of times playing online games, fail to regulate self on not playing online games, loss of passion in usual hobbies, over usage of online games despite the awareness of mental ill health, misleading families, counselors, or others about the degree of internet gaming, usage of internet games to alleviate unpleasant emotions and sacrificing jobs, relationships or education due to internet games. People with IGD are more likely to be preoccupied with online gaming for an extended period of time, which causes psychological and emotional distress such as depression, anxiety, and stress when they try to stop playing online. This

leads to insomnia because people with psychological and emotional distress are frequently found to have trouble falling asleep (Fazeli et al., 2020).

Problem Statement

First of all, the popularity of internet gaming has been increasing throughout recent years. Based on reports from Wijman and Gilbert (2021; 2022), the number of active gamers has been increasing every year, up to an additional 5.3% of increase from the year 2020 to the year 2021. Currently, there are 3.07 billion active gamers (Finances Online, 2022). IGD can lead to psychological and emotional distress such as depression, anxiety, and stress and thus contribute to insomnia (Ariatama et al., 2019; Fazeli et al., 2020; Wartberg et al., 2018). As such, this has raised the awareness of researchers to study on this topic.

Secondly, one of the sleeping disorders that has a high prevalence rate is insomnia. Based on studies by AlRasheed et al. (2022) and Mahmud et al. (2021), the prevalence of insomnia symptoms and insomnia is 52.57% and 43.76%, respectively. Moreover, Insomnia is also found to be common among adults. For instance, a study has found that one-third of adults have experienced and reported some insomnia symptoms, whereas 10 to 15% reported having faced functioning problems in the daytime, and 6 to 10% of adults show symptoms that are severe enough to be diagnosed with insomnia disorder as criteria have been met (American Psychiatric Association, 2013). On the other hand, within the context of Malaysia, a study by Zailinawati et al. (2012) found that out of 2049 participants, 38.9% of the participants showed frequent insomnia. In contrast, Zahari et al. (2022) found that 58.3% of respondents did not suffer from insomnia before. In contrast, another study by Abdalqader et al. (2018), based on university students, found that 69% of 445 participants suffered from insomnia in Malaysia. Thus, the results showing inconsistency indicate that further study should be done.

Insomnia can also lead to many other issues, both physically and mentally. For instance, several studies on college students have also suggested mental health problems such as depression, chronic fatigue syndrome, stress, anxiety, and lower quality of life (Abdel-Khalek, 2009; Sing & Wong, 2010; Taylor et al., 2013). These studies were supported by the American Psychiatric Association (2013), which states that aside from insomnia alone, 40 to 50% of individuals are also associated with another mental disorder. This is also supported by another study which stated that insomnia is a core symptom of psychiatric illness, such as

increasing the risk of depression and can also be associated with other issues such as cognitive decline, metabolic disorders, and cardiovascular disease (Gourineni, 2017; Li et al., 2016). On the other hand, as a study found that the prevalence rate of insomnia within university students are 32.8%, 19.1% and 2%, for subthreshold insomnia, moderate insomnia, and severe insomnia, respectively (Ismayatim et al., 2021). Thus, it is important that a study to be done on this topic to determine if IGD and smartphone addiction are predictors of insomnia, as it is beneficial for future research in the design of an preventive plan overcome the predictors and insomnia faced by Malaysian university students.

Among university students, it is proposed that several reasons may contribute to the occurrence of insomnia. For instance, the contribution of increasing age, such as progressive inactivity, dissatisfaction with social life and concurrent medical and psychiatric problems, and substance use, such as cigarettes before bedtime, and psychological distress such as depression, anxiety, and somatic symptoms (Mydin et al., 2012; Shahar et al., 2011; Zailinawati et al., 2008; Zailinawati et al., 2012). Other than that, in Malaysian university students, it is found that risk factors for insomnia are the usage of social media and mobile phones in the evening, at night, and before sleeping, the student's lifestyle, smoking habits, and stress (Abdalqader et al., 2018; Attalla et al., 2020; Ismayatim et al., 2021; Kamaruddin et al., 2021). However, there are not many studies that focus on the correlation between IGD, smartphone addiction, and insomnia, thus indicating that there is a need for a study to fill in the research gap.

In Malaysia, one study found that the prevalence rate for IGD among university students is 52.8% of 411 participants, whereas another study only found 2.5% of 237 participants (Jaafar et al., 2021; Ismail et al., 2021). Followed by smartphone usage in Malaysia. A survey found that more than three-quarters of handphone users (82.4%) were found to have been checking their handphones before going to bed or while in the middle of the night (Malaysian Communications and Multimedia Commission, 2021). As stated in a study by Abdalqader et al. (2018), insomnia can be due to using gadgets before sleeping. Additionally, it was found that the majority of respondents (54.2%) used handphones to check the time, followed by opening mobile messaging apps (35.6%) when asked about the first thing they would do after waking up, whereas only 0.4% of participants were found to have engaged in other activities such as to play games, to read news, to listen to music, and to check the battery status after waking up (Malaysian Communications and Multimedia Commission, 2021). Additionally, based on demographic differences in age group and

education level, smartphone users age group of 20 to 34 years old and tertiary education level shows 28.2% and 29.0%, respectively (Malaysian Communications and Multimedia Commission, 2021).

Besides, there are research gaps discovered from previous insomnia studies in Malaysian university students. Previous studies have mainly focused on social media and device usage, stress, and students' lifestyles (Mydin et al., 2012; Shahar et al., 2011; Zailinawati et al., 2008; Zailinawati et al., 2012). Additionally, not much study has been done on the field of insomnia among university students in Malaysia, where only several studies have been found (Abdalqader et al., 2018; Kamaruddin et al., 2021; Zahari et al., 2022), whereas other studies focused on working adults, adults, primary care patients, and elderly patients (Abdalqader et al., 2018; Attalla et al., 2020; Ismayatim et al., 2021; Kamaruddin et al., 2021). Thus, this study aims to study the context of insomnia in the context of Malaysian university students to fill in the research gap.

In short, this study claims and aims to discover that (1) IGD positively predicts insomnia, (2) smartphone addiction positively predicts insomnia, and (3) IGD and smartphone addiction positively predict insomnia.

Research Objective

1. To examine the relationship between Internet Gaming Disorder and sleep problem (insomnia) among university students in Malaysia.

2. To examine the relationship between smartphone addiction and sleep problem (insomnia) among university students in Malaysia.

3. To examine the relationship between IGD and smartphone addiction and sleep problem (insomnia) among university students in Malaysia

Hypothesis

1. Internet gaming addiction positively predicts sleep problem (insomnia) among university students in Malaysia.

2. Smartphone addiction positively predicts sleep problem (insomnia) among university students in Malaysia.

3. Internet gaming addiction and smartphone addiction positively predict sleep problem (insomnia) among university students in Malaysia.

Research Questions

i) Does smartphone addiction significantly predict university students' sleep problem (insomnia)?

ii) Does Internet gaming disorder significantly predict university students' sleep problem (insomnia)?

iii) Do smartphone addiction and Internet gaming disorder significantly predict university students' sleep problem (insomnia)?

Significance of Study

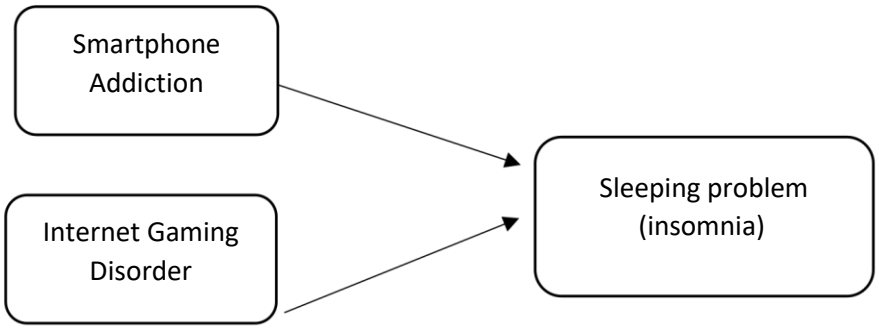
The findings of this study is aimed to be redound to the society and benefits the society, providing clear explanation of the issue, whether internet gaming disorder and smartphone addiction would cause sleeping problems for the undergraduate students in Malaysia. Undergraduate students are the pillars of the future nation. It is important for them to have a healthy lifestyle and away from sleeping problems which might trouble them for their daily life as well as their academic performance. Other than that, it may provide future researchers to study about other possible factors that could predict the sleeping problems among the young undergraduates. Meanwhile, the study intended to raise the awareness of the society and undergraduates about the impact of Smartphone addiction and Internet Gaming Disorders towards the sleeping problem. These findings could help to lead the society to modify effective ways and methods that could help to control these unhealthy phenomena happening.

In addition, this study could provide a reference for the authorities, policymakers, professionals and educators to create intervention programs and policy strategies for the problems. The predictive role of Internet gaming disorder and gaming addiction will be carried out respectively to figure out the possible factors of sleeping problem (insomnia). Thus, it assisted in creating and designing effective and related interventions programs that are evidence-based to the undergraduate students in order to help to solve their sleeping problem (insomnia). Furthermore, this study can help in improving the sleeping habits of undergraduate students by providing them with the knowledge about insomnia and its consequences, then allowing them to overcome this problem.

Lastly, this study also hopes the undergraduate students who have noticed this issue could also reduce their usage and time on Internet and gaming. Furthermore, the data of this finding could help to contribute for future reference for this field. Researchers who hope to study the causes, factors or relationship of internet gaming disorder, smartphone addiction and sleeping problems could benefit from this study. Last but not least, this finding also hopes to help the public to gain new knowledge from this study and could benefit them in their daily life.

Conceptual Framework

Figure 1



The main objective for our research is to study whether smartphone addiction and internet gaming disorder cause sleeping problems for undergraduate students in Malaysia. Internet addiction and internet gaming disorder were the predictors of our study while our outcome variable will be sleeping problems.

Conceptual Definition

Smartphone addiction

Smartphone addiction is defined as an individual overdose usage of smartphone causing neglection of other aspect in their daily life (Jabur et al, 2015). The smartphone addiction in the study presents that smartphone has been the needs for the study for their daily activities, but the uncontrolled use of smartphone will lead an individual to be addicted to it meanwhile lost time and interest into other activities (Jabur et al, 2015).

Internet Gaming Disorder

Internet Gaming Disorder (IGD) is known as the uncontrolled involvement of time and energy with video games which could cause an individual to have significant impact and deterioration for their daily activities (Ko, 2014). Internet Gaming Disorder will cause the gamers losing the sense of time in the period of playing video games, yet easily feel angry and stress for the video game itself and it might even cause their performance to drop due to the excessive time and effort spent on video games (Ko, 2014).

Sleeping problems (Insomnia)

Sleeping problems is defined as an individual having problems and difficulties in sleeping for everything, including from having bad quality of sleep, insomnia and other sleeping disorders (Thiedke, 2001). Meanwhile, sleep problems also mentioned an individual is not satisfied with their own sleeping pattern which led them to face consequences due to it. (Thiedke, 2001). Insomnia is one the most common sleeping problems which will cause people to be unable to sleep in the night, have bad sleeping quality which will wake in the middle of night and not be able to sleep back (Aernout et al., 2021).

Operational Definition

Smartphone addiction

To determine the smartphone addiction level, the Five-factor Smartphone Addiction Inventory short-form with 10 items (5F-SPAI-SF) constructed by Tan et al. (2022), will be

used for this research. There are a total of 10, where the scoring system will be from 1(strongly disagree0 to 4 (strongly agree). The total scoring for the respondent will be summed up to achieve the final score. The total score ranged from 10-40, where the higher the score, the higher the smartphone addiction level of the respondent.

Internet Gaming Disorder

For the study, Internet Gaming Disorder Scale-Short Form (IGDS9-SF) established by Pontes and Griffiths (2015) will be applied. This scale studies the respondent activities of online gaming in the period of the past 12 months. This scale consists of nine items, and it is answered by using the 5-point Likert scale, which is 1 equal to never to 5 which is equal to very often. The final score of the IGDS9-SF was gathered and the total score will be ranged within 9 to 45. The higher scoring indicates the greater IGD's symptoms of the participants.

Sleeping Problems (Insomnia)

The insomnia Severity index is used to examine the sleeping problems of the participants. This scale was constructed by Morin (2011) and it was used to examine the sleeping difficulties of people, including the problems facing their sleep and insomnia. The scale has a total of 7 items, and it requires the respondent to choose the answer for a scoring of 0 to 5. The final score is accumulated by summing up all the scores for the item, ranging from 0 to 28. The scoring categories are separated into 4, scoring of 0 to 7 refer to clinically significant insomnia, 8 to 14 is subthreshold insomnia, 15 to 21 is moderate severity of clinical insomnia while 22-28 show severe clinical insomnia. The higher the scoring represent the more severe situation of the respondent insomnia condition

Chapter 2: Literature Review

Sleeping Problem (Insomnia)

Insomnia is a common problem faced by the people in the society, and it is a common sleeping disorder which the symptoms of it is that it causes the patient to be unable to sleep for the night, have light sleeping symptom which they cannot sleep for long period of time, have enough sleep and it is difficult for them to have back sleep after waking up (Aernout et al, 2021). It is a sleeping disorder and public health problem that is faced by a lot of people, especially for the undergraduate young adults. Based on the research done by Sivertsen et at. (2018), 21% of the undergraduate students have insomnia problems and they mostly sleep less than 7 hours a day which is less than the normal sleeping hour which is 7 to 9 hours. Besides, the study done by Gardini et al. (2022), also showed that 30% of the undergraduate students have met the criteria of insomnia and they all acknowledge that this sleeping problems could lead them to have several negative effects. Performance deficit is the most significant impact caused by insomnia which leads the student to have difficulty waking up for their early class, and unable to concentrate for the studies (Gardini et al,, 2022). It also affects the academic result of the undergraduate, the findings from Vedaa et al. (2019), has found that the American 60% college students that have the sleeping problem, insomnia have attained a lower GPA for their examination. Besides, Insomnia also affects the daily life of the undergraduate students, in which they have less energy and interest to have social activities (Vedaa., 2019), such as going out with friends for a meal and having group discussion for assignments.

Besides that, insomnia also leads individuals to become more stressed in the daily events due to the inability to have a good rest for corresponding days (Kalmbach et al., 2018). Severe insomnia individuals are linked to have the risk of higher depression level, anxiety, and stress (Kalmbach et al., 2018). The journal written by Gardini et al. (2022) stated that insomnia might lead to the happening of more stressful events in the life of the individual. Almost 80 percent of the undergraduate students are facing moderate stress for their university life and almost 45 percent of them have insomnia problems (Amin et al., 2021). Insomnia has undeniably affected the undergraduate academic performance and it could not be resolved without a proper solution for the issue. This statistic has shown that insomnia is a

critical issue facing young adults nowadays and there is a need for society to know the crucial situation the student is facing and figure out a way to assist them from insomnia.

Smartphone addiction

According to Lin et al, (2016), smartphone addiction has four major components, which are compulsive phone usage, frequently checking for messages, longer and more intense use of smartphones, feeling anxious without smartphone and having problems with daily tasks and connections with friends physically. The use of a smartphone in daily life leads to smartphone addiction. Smartphones offer distinctive and remarkable functions that people insist on using in this digital and modern era. Users can play games, communicate with friends, messaging with friends, access online services such as YouTube, Facebook, Snapchat, Instagram, WeChat and WhatsApp, and search for information besides just making phone calls (Chen et al., 2017). However, these smartphone functions cause a person to have sleeping problems, cannot focus well, and wasting their valuable time. It has been stated that smartphone addicts are more prone to have sleeping problems or interruptions that impact their attention and academic performance. In Moattari (2017) study, he stated that there is previous research which revealed that there is a correlation between depression and over access to social network, playing online games, reading and replying to email, watching videos and listening to songs which all of these may be done with just a smartphone. These findings revealed a considerable increase in smartphone usage, which will increase users' stress. Excessive smartphones use and rising "technostress" among users are positively connected with social anxiety, locus of control issues, consumerism, and need for touch and communication. Due to smartphone addiction, student mental health keeps decreasing over the years. Anxiety and depression symptoms are also found in university students who are addicted to their smartphone. Furthermore, Moattari (2017) found that people prefer to use smartphones due to the convenience and information of smartphones. Behaviors such as feeling anxious without smartphones, frequently checking on messages are the causes of smartphone addiction. The Internet is the most important aspect for a smartphone as without it, smartphone addiction cannot check for messages, online games, social media, and updates in their smartphones. In the end, smartphones are now an important item for every individual in the world. Smartphone addiction can be very problematic as it can cause one to avoid social interactions with their friends or family, physical health problems, academic problems,

relationships problems and the most important sleeping problems. High smartphone usage has been linked to sleeping problems, as it reduces rapid eye movement (REM) and sleep effectiveness. In other words, smartphone addiction causes sleeping problems as they sacrifice their sleeping time by using smartphones. The light emission of smartphones and the radiation from the smartphone are the factors that cause people to have sleeping problems which make the users stay up all night and cannot fall asleep although their body and mind are very tired. However, there are results from a study that show that the number of male smartphone users with bad sleep quality outnumbers those with good sleep quality. University students are the major smartphone users when compared to other people of different ages (Hafidha, 2015). Smartphones have become an important tool for every student, where they tend to use their smartphone to utilize apps and new features. They use smartphones for calling, getting information through internet access online, playing online games, enjoying music and movies to take a short break from stressful situations. Hence, people do not notice the effects of smartphone addiction.

Furthermore, past research has linked various danger factors to people's life when they use smartphones excessively. According to a study conducted by Tao et al (2017), there is a possible relationship between smartphone use and psychological symptoms among college students. Depressive disorders and poor sleep quality also had an impact on the high rate of smartphone use. Using smartphones before sleeping to access social media or chatting with friends also will cause sleeping problems. According to a hand phone users survey by Malaysian Communication and Multimedia Commission (2021), the results of the survey showed that 42.1% of hand phone users frequently checked their phones (every 30 minutes or less) even when they didn’t receive any messages while 82.4% of hand phone users admitted that they will check on their phones just before bed or in the middle of the night. In addition, there are 41.6% of people who use hand phones while on public transportation and 53.2% of people who use hand phones in public places. Survey participants were also asked what they did just after they woke up using their smartphones (excluding turning off the alarm). Checking the clock was the top response among respondents (54.2%), followed by using mobile messaging apps (35.6%), while 1.1% checked their emails and 8.6% used social networking apps. Playing games, reading news, listening to music, and checking the battery status were some of the other activities that smartphone users engaged in which is 0.4%.

Internet Gaming Disorder (IGD)

Based on American Psychiatric Association (2013), IGD is defined as a disorder that leads to clusters in cognitive and behavioral symptoms, such as that patients will show symptoms of losing control over gaming, tolerance to extensive time of gaming, and withdrawal symptoms, analogous to the symptoms of substance use disorders. Additionally, using DSM-5 (American Psychiatric Association, 2013), IGD is diagnosed with the persistent and recurrent use of the internet game for at least 12 months, with the inclusions of at least 5 out of 9 criteria stated below: (1) highly preoccupied with games where it became the dominant activity. For instance, spend more time on gaming than other activities as they are preoccupied with internet gaming; (2) Show symptoms of withdrawal when the game is taken away. Which means that the person will show mood alteration, irritability, and anxiety, but physical symptoms of pharmacological withdrawal are yet to be discovered; (3) tolerance in increasing duration and time of gaming, which the person shows increases duration of internet gaming to fulfill their satisfaction; (4) failing the attempts to stop or reduces gaming. Such as trying to prevent themself from playing internet games but being unable to resist their need to play; (5) Only finding interest in internet gaming, concurrently losing interest in other previous hobbies and activities. This refers to the person being only focused on internet gaming, ignoring his/her previous favorite activities; (6) consistently gaming despite knowing psychosocial consequences. This means that even if they know the negative consequences of internet gaming, they choose to ignore and continue on the internet gaming, (7) deceiving the duration or amount of time spent on gaming to others. In which the person will hide the truth of the amount they spent on internet gaming towards family, therapists, or friends; (8) use of internet games to escape or relieve negative moods. For example, playing internet games so that they do not feel helpless, guilty, or anxiety; and (9) jeopardized or lost relationships, jobs, educational or career opportunities due to internet game participation. Such as that, they may fail their exam, lose their jobs, or break up with friends due to attending too much in internet gaming, to the degree that they mess up their relationships, jobs, or education.

Internet Gaming Disorder and Insomnia

Based on past studies, IGD was often related to insomnia, depression, and anxiety (Fazeli et al., 2020; Kim et al., 2016; Ko et al., 2020; Lin et al., 2021; Ohayon & Roberts, 2021; Severo et al., 2020; Yu et al., 2021). A study by Jeong et al. (2021) has suggested internet gaming for more than 4 hours of internet gaming daily may be interpreted as the person losing control over internet gaming, thus indicating that gaming time is also an indicator of severe IGD, which is also consistent with the study by Severo et al. (2020) that discovered that increased time in gaming increased the likelihood of IGD development. On the other hand, it was suggested that although a longer time of gaming successfully predicted insomnia symptoms, however, people also use mobile gaming as a maladaptive coping mechanism for regulating insomnia symptoms, which also reversely predicted IGD with insomnia (Guo et al., 2022). Following, Ohayon & Roberts (2021) have found that students with IGD also report higher chances of insomnia symptoms, with a number almost 2 times higher than students without IGD. However, upon readjusting the psychiatric disorder and health status, it is concluded that IGD was not a significant contributor to insomnia symptoms but might still contribute to other sleep issues, such as diminished sleep quality or continuity, and increased daytime fatigue as IGD is still strongly associated with non-restorative sleep and excessive fatigue (Ohayon & Roberts, 2021).

On the other hand, there are also studies that showed a significant correlation between IGD and insomnia (Fazeli et al., 2020; Kim et al., 2016; Lin et al., 2021; Severo et al., 2020; Yu et al., 2020). Based on Fazeli et al. (2020), people with IGD are more preoccupied with internet gaming for a long duration, which leads to psychological and emotional distress such as depression, anxiety, and stress when they are trying to withdraw from internet gaming afterward, thus resulting in insomnia as people reported with psychological and emotional distress are often found to face difficulties in sleeping. Additionally, the time involved with internet gaming might lead to insomnia due to the time spent on video games has occupied a big percentage of time in their daily life and leading them to have less sleeping time in a day. Besides, a study done by Peracchia & Curcio (2018), found that the excitement from the victory from video games will cause gamers to have difficulty sleeping, as the arousal levels have increased, and it is highly associated with sleeping.

Another study that found a relationship between IDG and sleep problems suggested that the increases in the frequency of internet gaming and prolonged gaming duration may

lead to poorer sleep quality as a result of the likelihood of delayed bedtimes and shortened sleep duration, arousal in their central and autonomic nervous system leading to sleep latency, physical discomforts such as muscle pain and headache (Achab et al., 2011; Fossum et al., 2014; Higuchi et al., 2005; Van den Bulck, 2004; Wong et al., 2020). Additionally, Higuchi et al. (2005) stated that high arousal, increased heart rate, and decreased sleepiness after playing games can cause reduced rapid eye movement (REM) and also results in sleep latency. Moreover, it is found that there is a positive strong correlation between IGD, perceived stress, and sleep quality, where increased stress will lead to increased internet gaming time spent to relieve themselves as a maladaptive coping mechanism, causing the time spent on gaming to interfere with sleep, and following by increased stress (Bansal & Kranti, 2022). In addition, the physical and psychological health of the person will be reduced by sleep disturbance and stress, thus making them more vulnerable towards developing gaming disorders (Bansal & Kranti, 2022).

Smartphone Addiction and Insomnia

Based on Liu (2022) study, university students who are addicted to their smartphones seem to be more likely to have poor sleep quality. Chen & Gau (2016) found that insomnia and night waking problems were indicators of smartphone addiction in longitudinal research. Additionally, research has shown that smartphone addiction is linked to daytime sleepiness, a shorter amount of time spent sleeping at night, later bedtimes, and poor sleep quality (Kawabe et al., 2019). According to previous findings, smartphone addiction was a predictor of insomnia during the COVID-19 pandemic's self-isolation phase (Júnior et al., 2021). Chang et al. (2022) revealed that children's sleep issues and sadness were likely brought on by smartphone addiction, online harassment, bullying and assault at school.

Furthermore, smartphone addiction has been correlated to sleep problems in teenagers and children (Chen & Gau, 2016). Both smartphone addiction and insomnia have both been linked to an increased chance of developing depression (Saquib et al., 2017; Tan et al., 2016). According to certain studies, the effect of smartphone addiction on depression in adolescents is transmitted by insomnia (Li et al., 2017). According to a review of the research, problematic smartphone use including smartphone addiction is connected with a decrease in sleep quality which includes insomnia (Sohn et al., 2019). According to Chen et al. (2017),

smartphone functions such as playing games or chatting with friends can cause a person to have sleeping problems (insomnia), cannot focus well, and wasting their valuable time.

Kumar et al. (2019) stated that the incidence of smartphone addiction in the community particularly among adolescents and younger adults should be evaluated because it is frequently mentioned in the medical literature. Although there was no discernible gender difference, over half of the medical students were found to be smartphone addicts, with the male population being more affected. According to the results of their current study, smartphone addiction is linked to poor sleep. Medical students who use smartphones have been reported to have poor sleep quality. Similar to other sleep quality studies, it was discovered that smartphone addiction was linked to poor sleep (Ibrahim et al., 2018). Poor sleep quality has been linked to longer average screen time and younger age (Christensen et al., 2016). According to Ibrahim et al. (2018) study, high smartphone use was linked to both poor sleep quality and poor academic performance among medical students.

Uses and Gratification Theory

In this study, the Uses and Gratification Theory (U&G) are used to explain the use of smartphone and internet gaming in the context of Malaysian university students. The U&G refers to the goal of a person using the media and the gratifications received from using it (Quinn, 2016). Additionally, there are 5 assumptions of media consumption, which are (1) goal-oriented and motivations of using media; (2) types of media are selected by the audience to achieve their gratification (3) the use of media is driven by the person's social and psychological factors; (4) Media compete with different other communication forms; (5) messages from media does not exert strong effects on people (Rubin, 1993).

Thus, in this study, the selected media is internet gaming and smartphones. It was found that the issues of problematic gaming are the result of gamers' constant need for gratification caused by the psychological need for a sense of pleasure while playing games that resembles the feeling of virtual reality that players immerse themselves in (Teng, 2010). The immersed feeling into the video games and the positive reinforcement such as happiness from victory, appraisal from other gamers will lead the player to spend more time and energy in it, as their desire to win has been fulfilled in the virtual world of video game and gamers viewed it more important than other psychological well-being, in this case it will be having rest and sleep. According to Pilcher et al. (2015), chronic sleep deprivation is highly

correlated with the self-control of an individual. As gamers that are addicted to video games are likely to have less control for their time and they are more likely to deal with sleeping problems, such as insomnia.

Secondly, as smartphones are also applicable for social media browsing, people are more dependent on smartphones, which can result in smartphone addiction. According to a study by Parker & Plank (2000), repetitive usage of smartphones will reduce the users' experience of happiness and satisfaction. This will then result in a person spending a longer duration of smartphone usage to fulfil their satisfaction, thus postponing their bedtime (Geng et al., 2021). The temporary feeling of gratification, along with the temptation of using smartphones to chat, browse, and watch videos are tempting that smartphone addiction will be unable to deny, leading to bedtime procrastination (Geng et al., 2021).

In the article written by Hussain et al. (2021), it mentioned that people spend much time on video games is often due to the fact of escapism from stress, depression in life and as a tool to release stress. Individuals who face the problem of internet gaming addiction might face difficulties, such as peer pressure and academic stress, which makes them tend to immerse themselves into video games. Meanwhile, gamers also have the feeling of freedom when they are playing video games (Hussain et al., 2021), and this leads them to receive gratification from it as they are out of stress and happy while playing video games. Besides, gamers could get appraisal and cheers from other players for their extraordinary performance in the video games which also led them to have the gratification as they could not receive accomplishment for their effort in daily life. These rewarding experiences from video gamers might lead the individuals to be more dependent on it and have internet gaming disorder.

Chapter 3: Methodology

Research Design

The study is cross-sectional, and it is aimed to study the prognostic effects of smartphone addiction, and internet gaming disorder (IGD) to the sleeping problems (insomnia) among the young undergraduate studying in Malaysia. Cross-sectional studies are the gathering of a group of data and information on the one point in the moment and there is no involvement of time dimension (Kesmodel, 2018). The study has applied quantitative research design as the data we want to collect is in the form the numbers, and it used for our data analysis and to conduct statistic as well as research hypotheses. The initial data that we collected from the undergraduate students in our research study included data of smartphone addiction, internet gaming disorder and sleeping disorder independently. Cross-section study was picked for the study due to it allow several variables to be compared together on the same time without much cost (Kesmodel, 2018). Besides, cross-sectional study is way cheaper to be held on and it is easy to be conducted (Kesmodel, 2018).

Sampling Procedures

Sampling Method

Non-probability sampling method was applied in this study. Non-probability sampling method is defined as the data sample was not randomly selected but involve consideration (Ayhan, 2011). To be specific, purposive sampling method was used for the study for picking and choosing the targeted student for our sample data. The purposive sampling method, which is known for the judgement sampling is the selection of participants subjectively, which is not randomly selection, and it is based on the participants' judgement (Ayhan, 2011). The respondent was chosen based on the criteria needed in the study, for example the undergraduate who is currently gamers in the university. Undergraduate students who were around the age of 18 to 26, which are also young adults are viewed as qualified respondent and they are the target participants that the study needed. The reason behind it is that the study done by Sohn et al. (2021), shown that the age group of young adults has sleeping problem more due to the excessive use of smartphone and internet. Sleeping problems could cause an individual to have several consequences including from stress, pain, depression, anxiety and even the deficits of performance (Medic et al, 19 2017). Sohn et al (2021) also mentioned in the article that there is greater risk in the future that the young adults would be more adopt to the smartphone use especially for gaming purpose. Therefore, these factors

have led to the conduct of this study which the to study sleeping problems faced among the undergraduate students in Malaysia.

Instruments

Five-factor Smartphone Addiction Inventory short-form with 10 items (5FSPAI-SF).

The 5F-SPAI-SF is an instrument altered by Dr Tan Chee Seng and it was used to detect the smartphone addiction's symptoms of the respondent (Tan, 2022). This instrument has a total of 10 items, and it is being scored from four choice, scoring from 1 which is (strongly disagree) to 4 which is (strongly agree). The example of the scale items was "I feel uneasy once I stop smartphone for a certain period of time", "I need to spend an increasing amount of time on smartphone to achieve same satisfaction as before" and "I use smartphone for a longer period of time and spend more money that I had intended". The total score was ranged from 10-40, the scoring of higher score indicates shows higher smartphone addiction level of the respondent. According to the study conducted by Pavia et al. (2016), the scale showed a good reliability coefficient ranging from 0.70-0.78. This scale also presents a remarkable concurrent validity (Pavia et al., 2016)

Insomnia Severity Index (ISI).

The insomnia Severity index is a scale made constructed by Morin (2011) and it was aimed to test the people's sleeping difficulty. The scale has a total of 7 items, and it require the respondent answer by the scoring of 0 to 5. Some items included "How satisfied/dissatisfied are you with your current sleep pattern?", "how noticeable to others do you think your sleep problem is in terms of impairing the quality of your life?" and "How worried/distressed are you about your current sleep problem?". The final score is calculated by adding up all the score for the item, which ranged from 0 to 28. The scoring criteria are divided into four categories: scores ranging from 0 to 7 indicate clinically significant insomnia, 8 to 14 signify subthreshold insomnia, 15 to 21 represent moderate severity of clinical insomnia, and scores between 22 and 28 indicate severe clinical insomnia. A concurrent validity is 20 achieved in the study, and an internal consistency of .74 is showed in the study which is determined as good consistency (Bastien et al., 2001)

Internet Gaming Disorder Scale-Short Form (IGDS9-SF).

The IGDS9-SF is established by Pontes and Griffiths (2015) and it was aimed to examine respondent symptoms of IGD. It examines the online gaming activities of the respondents over the past 12 months. This scale is consisting of nine items in total including items like “Do you feel more irritability, anxiety or even sadness when you try to either reduce or stop your gaming activity?”, “Have you continued your gaming activity despite knowing it was causing problems between you and other people?” and “Do you play in order to temporarily escape or relieve a negative mood (e.g., helplessness, guilt, anxiety)?”. All of the nine items are answered with 5-point Likert scale (1= never, 5= very often). The final score of the IGD could be done by gathering up the score for each of the item. The score could be ranged from 9 to 45, where the higher the score, the greater the IGD’s symptoms. Based on the research done by Lemmens and Valkenburg (2015), the IGDS9-SF has a good reliability with a value of .95. The study also exposed that this scale has a criterion-related validity due to it have significant correlation coefficients in its measurement (Lemmens & Valkenburg, 2015).

Location

Google form was used as the online self-report questionnaire for the study. Google form is the online survey form owned by Google, but it is free to use for the public to create surveys and it could help to summarize the feedback and generate graphs for it. The google form was distributed among several platforms, including Microsoft Teams, WhatsApp, Facebook, Instagram, and Discord. Meanwhile, it is distributed in University Tunku Abdul Rahman as students around the campus were invited to helped with the form by scanning the QR code for the online questionnaire.

Ethical clearance

The Ethical clearance approval has been received from Universiti Tunku Abdul Rahman (UTAR) Scientific and Ethical Review Committee (SERC) for the research study after ending and completing the proposal. We provided our online questionnaire sample to SERC with the assist of our supervisor and successfully received the approval letter. The reference number for our FYP approval letter is U/SERC/02/2023. The process of data collection started after receiving the ethical clearance approval from all the authorities in charge, to conduct all the procedures in a proper ethical manner.

Sample Size

In this study, the analysis program, G*Power version 3.1 by Faul et al. (2009) will be used to calculate the sample size. Cohen (1988) has proposed that f2 = .02 is considered small effect size, f2 = .15 as medium effect size, and f2 = .35 as a large effect size, thus to test the hypothesis 1, 2 , and 3, multiple linear regression was used to investigate the predictive role of IGD and smartphone addiction on insomnia. Additionally, the correlation coefficient of the two studies between IGD, smartphone addiction and insomnia (Bhatt & Gaur, 2019) were used in the equation of R21-R2 by Cohen (1988), and the effect size calculated is .16. Next, for desired statistical power level, 0.95 is used and with probability level of 0.05. Thus, the total sample size required is n = 100. However, to ensure sufficient responses after data cleaning, such as missing data and outliers, a total of 30% was added to calculate the sample size. As such the final sample size is 145 undergraduates in Malaysia. We have received a total response of 162 respondents throughout the process of data collection, 145 from the responses has fulfilled the criterion and requirement for our survey questionnaire used for data analysis.

Data Collection Procedures

Inclusion and Exclusion Criteria

For the research study, a total of three inclusion criteria is needed to be met by participants. The participants need to be qualified for the listed criteria: (i) He/ She is Malaysian, (ii) He/ She is a young adult aged between 18 to 26 years old, (iii) He/ She is currently an undergraduate student. Meanwhile, the exclusion criteria include participants who were having undergraduate studies in other countries overseas which is not in Malaysia and half-done surveys with incomplete responses.

Procedures of Obtaining Consent

The procedures of obtaining informed consent from the participants is in the first part, which is the first page in our survey questionnaire, and it was the Consent Form for Research Participation and Personal Data Protection. This form has included the details and aim of this study, the self-voluntary participation, concerns about confidentiality, risk, researchers' contact and information, and lastly the inclusion criteria of respondent. Since the beginning of the survey, respondents were being informed that participation is based on self-voluntary, and any withdrawal is allowed and there is no explanation needed. Furthermore, the survey

has stated clearly about all information received will only be used for academic purpose and the information of respondents will be kept anonymous.

Description of Data Collection Procedures

Google form, an online survey questionnaire was used to prepare the online survey for the study. It was distributed online on the social media, including, Facebook, Instagram, Microsoft Team, WhatsApp, Discord and Microsoft Team, and physically distributed around campus area of University Tunku Abdul Rahman. Hyperlink and QR code were generated for the survey to allow the student to access the survey easily and the respondent could also help to share to their peers easily. This survey questionnaire has been distributed among the students and to a total of 162 responses has received, 3 disagree on consent, 146 out of 159 is used for data. The SPSS software was used to conduct the following analysis after all the incomplete data and outliers is removed.

Dates/duration of recruitment

The duration for our respondent's recruitment was 5 weeks, where it started from the 30th of January and ended on 6th March. The recruitment process ended after the expected responses which are 145 responses have been collected.

Pre-test

A pre-test was done before the actual data analysis is done to evaluate the questions distribute are clearly explained and segmented in order to receive accurate and appropriate answer from the respondents. The purpose of a pre-test applied is to find out the possible problems with the instrument and seek solution for it (Berry, 2008). There was a total of 10 participants included for the pre-test. Pre-test can test the understanding of the respondents towards the questionnaire and helped to improve the instrument used for the survey.

	Instruction and Question that confused respondents (misleading and lack of clear explanation for the needs of question)	Amendment (for brief and clear explanation to the respondents)
1.	Section B: Severity of Insomnia	Section B: Severity of Insomnia

	The following section consists of 2 parts made up of seven questions to rate the CURRENT (I,e. LAST 2 WEEKS) severity of your insomnia problems	Please answer the following seven questions about your CURRENT (in the last 2 WEEKS) insomnia problem.
2.	Section B: Q2. Difficulty staying asleep	Section b, Q2. Difficulty staying asleep. (e.g., Unable to sleep from night to morning, keep waking up, etc.)
3.	Without Demographic Information	Added Demographic Information

Chapter 4

Result

Descriptive Statistic

Demographic Characteristics

The research sample's demographic is presented in Table 4.1. This study sample size is 146 with 83 males (56.85%) and 63 females (43.15%) of age between 19 to 25 years old. The mean age of participants is 21.48 years with a standard deviation of (SD = 1.134). Next, the sample consists of 94.5% of Chinese, 3.4% of Indian, and 0.68% of each Malay, Iban, and Punjabi. Among the samples, there are 47.26% of third-year undergraduates, 27.40% of first-year undergraduates, 23.97% of second-year undergraduates, and 1.37% of fourth-year undergraduates. Lastly, students in Universiti Tunku Abdul Rahman (79.45%) are the majority of participants, whereas the remainder of participants (20.45%) are currently studying at Monash University Malaysia, Multimedia University, Quest International University, Taylor's University, Tunku Abdul Rahman Universiti of Management and Technology, UCSI University, University Malaya, Universiti Malaysia Pahang, Universiti Putra Malaysia, Universiti Teknikal Malaysia Melaka, and the University of Reading Malaysia.

Table 4.1 Demographic Information of Research Sample

Demographic Information of Research Sample (n=146)

	n	*%*	*M*	*SD*	Min	Max
Gender						
Male	83	56.85				
Female	63	43.15				

Age			21.48	1.134	19	25
19	3	2.05				
20	30	20.55				
21	33	22.60				
22	62	42.47				
23	12	8.22				
24	4	2.74				
25	2	1.37				
Ethnicity						
Malay	1	0.70				
Chinese	138	94.50				
Indian	5	3.40				
Iban	1	0.70				

Punjabi	1	0.70
Academic Year		
Year 1	40	27.40
Year 2	35	23.97
Year 3	69	47.26
Year 4	2	1.37
Institution		
Universiti Tunku Abdul Rahman	116	79.5
Tunku Abdul Rahman Universiti of Management and Technology	11	7.5
Taylor's University	5	3.4
Multimedia University	4	2.7
Monash University Malaysia	2	1.4
Universiti Malaya	2	1.4

UCSI University	1	0.7
Quest International University	1	0.7
Universiti Malaysia Pahang	1	0.7
Universiti Putra Malaysia	1	0.7
Universiti Teknikal Malaysia Melaka	1	0.7
University of Reading Malaysia	1	0.7

Note. n : Number of respondent; *%* : Percentage; *M* : Mean; *SD* : Standard deviation; Min : Minimum value; Max : Maximum value

Topic-Specific Characteristics

Table 4.2 shows the frequency distribution of characteristics specific to the topics of (Insomnia, Internet Gaming Disorder, and Smartphone Addiction). Morin (2011) developed a scoring system for insomnia which is Insomnia Severity Index. where a score of 0-7 indicates the absence of clinically significant insomnia, a score of 8-14 indicates subthreshold insomnia, a score of 15-21 indicates moderate severity clinical insomnia and lastly a score of 22-28 indicates severe clinical insomnia. As a result, 21.23% of respondents (n=31) have no clinically significant insomnia, 43.84% of respondents (n=64) are having subthreshold insomnia, and the percentage of participants with clinical insomnia (moderate severity and severe) are 25.34% (n=37) and 9.59% (n=14) respectively. Continuing with the scoring of internet gaming disorder, where 2.74% (n=4) of the respondents achieved a total score of above 35. Based on Pontes & Griffiths (2015), he established a cut-off point in the scale to distinguish between disordered gamers and non-disordered gamers. The remaining 97.26% (n=14) participants do not meet the criteria of having at least 5 “very often” endorsed as it is translated to the criteria of the disorder. Lastly, the creator of the short-form version of Five-

factor Smartphone Addiction Inventory which consist of 10 items does not indicate a cut-off point for the scoring, but an indication that a higher score achieved from 10-40 reflects a higher smartphone addiction. However, in this study, the percentile will be used, and the median formula will be used to find the cut-off point. Thus, the median of this scale is 26 and will serve as the cut-off point. As such, 45.89% (n=67) of respondents do not have smartphone addiction, whereas 54.11% (n=79) of respondents are classified as smartphone addicts.

Table 4.2 Frequency Distribution of Topic-Specific Characteristics

	n	*%*	*M*	*SD*	Min	Max
Insomnia			12.62	13.00	0.00	28.00
No clinically significant insomnia	31	21.23				
Subthreshold insomnia	64	43.84				
Moderate severity Clinical insomnia	37	25.34				
Severe Clinical insomnia	14	9.59				
Internet Gaming Disorder			21.17	8.80	9.00	45.00
<35	142	97.26				

≥35	4	2.74				
Smartphone Addiction			25.68	6.73	10.00	40.00
<26	67	45.89				
≥26	79	54.11				

Note. n : Number of respondent; *%* : Percentage; *M* : Mean; *SD* : Standard deviation; Min : Minimum value; Max : Maximum value

Data Diagnostic and Missing Data

Frequency and Percentages of Missing Data

There are 16 responses that have been removed, which include 3 responses that disagree with the consent form, 7 responses due to nationality differences as 5 respondents are from China, 1 from Hong Kong, and 1 from Hindu. Lastly, 6 incomplete pieces of information were also removed. Despite the fact that the minimum required sample size calculated using G*Power software was n=100, the target sample set was set to 145 to account for potential missing data. However, even after removing some data, the target sample size was still attained.

In total, 146 data are included in the subsequent analysis.

Criteria for Post-Data-Collection Exclusion of Participants

After reviewing the responses collected, 10 out of 162 responses did not meet the inclusion criteria where 3 respondents disagreed on consent form, 7 respondents were students from other countries (China and India), and 6 respondents did not submit the complete information. Thus, a total of 146 responses are included in this study.

Assumptions of Normality

All independent variables were subjected to a normality test, such as Internet Gaming Disorder (IGD), Smartphone addiction and the dependent variable which is Insomnia. The assessment methods employed included P-P plot, skewness and kurtosis, histogram and Kolmogorov-Smirnov (K-S) Test.

P-P Plot

All variables were found to meet the normality assumption as indicated by the P-P plots with the most of the scores that were observed closely or exactly aligning with the expected scores along the diagonal line.

Skewness and Kurtosis

The normality assumption for all variables was not violated since none of the values for skewness and kurtosis exceeded the range that is considered acceptable which is ±2 as established by (Gravetter & Wallnau, 2014). Specifically, the skewness values were -.338, .160, and .468 for smartphone addiction, insomnia and Internet gaming disorder respectively, while the kurtosis values were -.161, -.309, and -.577 for the same variables. These results are presented in Table 4.3.

Histogram

The histograms of the variables exhibited are normally distributed, with all graphs appearing symmetrical when cutting in the middle of them. Therefore, the histogram shows that the normality is derived well by all the variables.

Kolmogorov-Smirnov (K-S) Test.

The present K-S test revealed statistically significant for insomnia with $p<.05$, $D(146) = .07$, $p = .076$, and internet gaming disorder with $D(146) = .11$, $p < .001$. This may be due to the large sample size in this study. However, based on a previous study by Ghasemi & Zahediasl (2012), the obtained significant result is considered acceptable as it would be expected for a large sample size study.

Conclusion of Assumptions of Normality.

All of the normality indicators, which include the assumption of normality, P-P plot, skewness and kurtosis, histogram and Kolmogorov-Smirnov (K-S) Test are satisfied by the variables of smartphone addiction, internet gaming addiction and insomnia. Hence, the normality of data distribution was satisfied as the variables has contended all of the normality indicators

Table 4.3

Skewness and Kurtosis

	Skewness	Kurtosis
Smartphone Addiction	-.338	-.161
Internet Gaming Disorder	.468	-.577
Insomnia	.160	-.309

Defining and Processing of Statistical Outliers

The statistical outliers of the data were processed and figured out by the normality test by the SPSS software. There were no significant outliers found in the variable, smartphone addiction, internet gaming disorder and insomnia. Hence, the total number of 146 data remained still since no outliers is found

Assumption of Multiple Linear Regression

In order to establish the generalizability of the regression model, certain assumptions needed to be satisfied. This study conducted four tests to verify the presence of

multicollinearity, error independence, multivariate outliers and influential cases, as well as the normality and linearity of residuals and homoscedasticity

Test on Multicollinearity

The test for multicollinearity involves examining the strong correlation between two or more predictor variables in a regression model, it might pose challenges in estimating the regression coefficients accurately and interpreting the model correctly. Variance Inflation Factor (VIF) and Tolerance were applied and used for the testing of multicollinearity of the predictors, the smartphone addiction and internet gaming disorder. Daoud (2017) has specified that a tolerance threshold of ≤ .10 and a VIF threshold of ≥ 10 should be met to identify the presence of multicollinearity. Based on the diagram presented in Table 4.4, the assumption of multicollinearity was not upheld for the predictors because VIF values were < 10 while the tolerance values were > .10, indicating no presence of multicollinearity. In addition, Cook's Distance > 1 were considered as potential outliers based on Cook and Weisberg (1982). As such, no outliers were found in the data. Whereas for Mahalanobis Distance, no violation was found as all of the responses achieved $p > .001$.

Test on Independence of Errors

The test on the independence of errors should be met in order to show that the residuals exhibit independent correlation. The assumption in this study is tested by using Durbin Watson. The violating assumption values are < 1 or >3, where values closer to 2 show a higher consistency to the assumption. Table 4.5 has shown the Durbin-Watson value to be 1.899 which is <1 and >3, showing that the independence of errors was not violated.

Test on Normality and Linearity of Residuals and Homoscedasticity

The scatter plot in Appendix (C), has presented an oval shape with all the residuals allocated and distributed separately and evenly. Hence, the normality and linearity of residuals and homoscedasticity were contended.

Test on Multivariate Outliers and Influential Cues

According to Cook and Weisberg (1982), the potential outliers are values that achieved > 1 in Cook's Distance. Hence, there are no potential outliers in this study as all cases acquired Cook's Distance of ≤ 1.

Conclusion on Assumptions of Multiple Linear Regression

The study met the assumptions tests of Multiple Linear Regression as there was no presence of multicollinearity or error dependence, and no exclusion of any potential outliers. Meanwhile, the normality, linearity of residuals and homoscedasticity were achieved for the study. Hence, the assumptions tests of Multiple Linear Regression could be concluded as satisfied.

Table 4.4

Multicollinearity Test

		Tolerance	VIF
1	(Constant)		1.292
	Smartphone Addiction	.774	1.292
	Internet Gaming Disorder	.774	1.292

Dependent Variable: Insomnia

Table 4.5

Independence of Errors Test

Model	Durbin-Watson
1	1.899

Data Transformation

The three instruments used for the study, Five-factor Smartphone Addiction Inventory short-form with 10 items (5FSPAI-SF), Insomnia Severity Index (ISI) and Internet Gaming Disorder Scale-Short Form (IGDS9-SF) only includes positive items which there were no negative items. The score obtained is positively added to receive the final point for each scale. After the data transformation has been done, further analysis was proceeded by totaling the accumulated score.

Statistical Analyses

This study aims to investigate three hypotheses and the results obtained will be analyzed for each of them.

***H1*: Internet gaming disorder positively predicts sleep problems (insomnia) among university students in Malaysia**

The PPMC was carried out to test whether internet gaming addiction positively predicts insomnia. The test assumption has been carried out to confirm all the distribution of data was normal.

Table 4.6 has presented that internet addiction has positively predicted sleep problems (insomnia) with $F(1,144) = 30.323$, $P < .001$, and accounted for 16.8% in variance. The effect size was calculated using Cohen (1988) formula of $f2 = R2 / (1 - R2)$, which indicated the small effect size of $f2 = .211$. In addition, it was found that internet gaming disorder ($\beta = .417$, $p < .001$) does predict insomnia. Hence, H_{1a} was supported.

***H2*: Smartphone addiction positively predicts sleep problem (insomnia) among university students in Malaysia**

Various assumptions of MLR were examined, such as multicollinearity, independence of errors, multivariate errors, influential cases, and normality and linearity of residuals and homoscedasticity, to ensure that the regression model was appropriate for the collected data. (see section Analyses of Data Distributions).

The MLR has been done to find out whether smartphone addiction predicts Insomnia. Based on Table 4.6, the regression model showed statistical significance, $F(1, 144) = 59.261$, $p < .001$ and 28.7% for the variance. The formula used indicates that the large effect size of $f2 = .41$ was observed, indicating so by utilizing $f2 = R2 / (1 - R2)$ (Cohen, 1988). Smartphone addiction was figured out as a positive predictor to Insomnia ($\beta = .540$, $p < .001$). Hence, H1c was supported.

***H3*: Internet gaming disorder and smartphone addiction positively predicts sleep problem (insomnia) among university students in Malaysia**

Various assumptions of MLR were examined, such as multicollinearity, independence of errors, multivariate errors, influential cases, and normality and linearity of residuals and homoscedasticity, to ensure that the regression model was appropriate for all the data. (see section Analyses of Data Distributions).

The MLR has been done to find out odes internet gaming disorder predicts Insomnia. Based on Table 4.7, the regression model showed statistical significance, $F(2, 143) = 34.391$, $p < .001$ and 31.5% for the variance. It was found that internet gaming disorder ($\beta = .207$, $p < .001$) and smartphone addiction ($\beta = .441$, $p < .009$) both positively predict insomnia. The formula used indicates that the large effect size of $f2 = .48$ was observed by utilizing the formula where $f2 = R2 / (1 - R2)$ (Cohen, 1988). In Table 4., internet gaming disorder and insomnia were figured out as significant predictors of Insomnia ($\beta = .207$, $p < .001$). Hence, H1d was supported.

Table 4.6

Coefficients Among Variables

	t	*Std. β*	*Unstd. β*	*p*
Internet Gaming Disorder	5.507	.417	.295	<.001
Smartphone Addiction	7.698	.540	.499	<.001

Note. Dependent Variable : Insomnia ; Std. β : Standardized Beta ; Unstd. B : Unstandardized Beta

Table 4.7

Result of Regression Coefficient

	t	*F*	*p*	*Adj. R2*
Regression	*2*	*30.323*	*.001*	*.168*
Residual	*143*			
Total	*145*			

Table 4.8

Result of multiple linear regression

	t	*Std. β*	*Unstd. β*	*p*
Internet Gaming Disorder	2.653	.207	.146	.009

Smartphone Addiction	5.652	.441	.408	<.001

Chapter V

Discussion & Conclusion

The present study focused to examine if IGD and smartphone addiction significantly and positively predict insomnia among undergraduates in Malaysia. Additionally, IGD and smartphone addiction are examined using simple linear regression and multiple linear regression respectively. The results from the regression model of the present study showed that IGD, and smartphone addiction are significant insomnia predictors when measured alone and when combined.

H1 Internet gaming addiction positively predicts sleep problem (insomnia) among university students in Malaysia

Based on the result, the hypothesis 1 is supported and are in line and is similar with previous research of the topic (Guo et al., 2022; Lin et al., 2021). The possible reason for this may be due to the change in arousal and emotions which can all be related to large and face music and visual beauty of the game (Lankoski, 2012). For instance, the study by Exelmans & Van den Bulck (2017) and Wang & Scherr (2022) found that the increases in cognitive arousal and higher levels of pre-sleep arousal will also lead to insomnia. The pre-sleep arousal may be experienced more in person that seeks more sensation and have lower levels of delayed gratification, where sensation seeking is found to have appositive relationship with internet gaming disorder (Chiu et al. 2004; Hu et al. 2017; Mehroof & Griffiths 2010; Wang & Scherr, 2022). Additionally, the loss of control over gaming may also lead to prolonged gaming session, and in turn may develop physical discomfort such as headache and muscular pain, thus delaying the bedtime due to the discomfort (Aggarwal & Pandian, 2019; Fossum et al., 2014). However, due to the feeling of gratification that the person enjoys from playing internet games, instead of putting an end to the gaming behaviour, they might choose to ignore the pain and continue playing. As stated by Yamada et al. (2021) and as one of the criteria of DSM-5 (American Psychiatric Association, 2013), people that are classified with IGD may continue playing despite knowing the negative consequences of doing so. As such, this can lead them into more physical discomfort and develop into insomnia starting from the showing of its symptoms. Moreover, as suggested by Higuchi et al. (2005), the playing of shooting game will also increase the heart rate and decreases the sleepiness, with a longer sleep latency and a shorter REM sleep, which can contribute to insomnia.

H2 Smartphone addiction positively predicts sleep problem (insomnia) among university students in Malaysia

Following, H2 is also supported by the results in this study and show similar results to previous studies (Bhatt & Gaur, 2019; Júnior et al., 2021). In the study by Liu et al. (2022), insomnia can be caused by smartphone addiction due to several different reasons such as the long exposure time to the blue light emitted from the phone screen, which lead to the disturbance in melatonin level and affect their sleep and wakefulness. Additionally, study has also found that prolonged exposure to electronic gadget can lead to insomnia, and in the context of smartphone addiction, the person will have constant urge to check up on their phone, which will stimulate the reward centre in their brain leading to an affected sleep quality (TELGOTE et al., 2021). The reward and punishment system in gaming will lead to I imbalance of transmitter pathways of dopamine yet The prolonged used of smartphone is also likely to lead to shorter sleep duration and insomnia as the person may have prolonged use of smartphone that cause them to delay their bedtime, or that the increased psychological stress due to overusing smartphone will results in affected sleep and the person's physical recovery (Liu et al., 2022; TELEGOTE et al., 2021). In addtion, this may also be due to the anxious feeling of the person due the psychological issues such as the fear of missing out from the rewarding experience of the others due to their absence, or connections with the others, which can also lead insomnia (Adams et al., 2020). Lastly, the study by Li et al. (2022) also found that fear of missing out as the predictor of smartphone addiction. Thus, leading to insomnia.

H3 Internet gaming addiction and smartphone addiction positively predict sleep problem (insomnia) among university students in Malaysia.

Lastly, the result in this study has supported H3 which also show similar results to previous study (Yilmaz et al., 2023), said that internet gaming disorder (IGD) has a positive relationship in predicting different health concern and insomnia. It pointed out the scenario of young plays video games while watching YouTube, and life stream of others gaming streamer occurs often (Yilmaz et al., 2023). As mentioned in the article written by (Dresp-Langley & Hutt, 2022), the excessive use of digital device, including from excessive playing of games and usage of mobile phones will lead to sleeping problem such as insomnia. It stated that these addiction towards gaming and smartphone is like a modern drug which would lead the individual to spend unlimited and unreasonable time on them especially for the young adults (Dresp-Langley & Hutt, 2022). Furthermore, based on the study done by Liu

et al., (2016), individuals facing with smartphone addiction and internet gaming disorder are suffering from insomnia for due to they reduce sleeping time often for gaming and playing phone, which leads their sleeping pattern slowly been interrupted and reported with a higher rate of insomnia (Lee et al., 2021). Bedtime excessive usage of smartphone also shows more disruptive effects on sleeping behaviour (Lee et al., 2021), while goes then same with bedtime procrastination due to video gaming has highly decrease the sleeping quality of individual and delay the sleeping hour and lead to insomnia (Wei et al., 2022).

Implications

Theoretical Implications

This research study provides several theoretical implications regarding the relationship between internet gaming disorder (IGD) and smartphone addiction with insomnia among undergraduates in Malaysia. Firstly, this study confirms previous research that IGD and smartphone addiction are significant insomnia predictors (Guo et al., 2022; Lin et al., 2021; Bhatt & Gaur, 2019; Júnior et al., 2021). This study shows that negative emotions like anxiety, stress, anger, irritability, and excitement can raise the heart rate when playing internet games before going to bed. Additionally, the loss of control over gaming may lead to prolonged gaming sessions which lead to physical discomfort such as headaches and muscular pain. These can cause the delay of bedtime due to the discomfort (Aggarwal & Pandian, 2019; Fossum et al., 2014). Besides that, this study shows that playing shooting games can increases the heart rate, decreases sleepiness and contributes to insomnia (Higuchi et al., 2005). Additionally, smartphone addiction can leads to shorter sleep duration, insomnia and lower sleep quality. The prolonged use of smartphones can cause individuals to delay their bedtime which may cause lack of sleep to the individuals (Liu et al., 2022; TELGOTE et al., 2021). The exposure to blue light emitted from smartphones can also disturb melatonin levels, leading to further sleep disturbances (Liu et al., 2022). Finally, the fear of missing out, which is associated with smartphone addiction, can lead to anxiety and insomnia (Adams et al., 2020). The study also highlights the importance of early identification and intervention for individuals with IGD and smartphone addiction to prevent the development of insomnia. Early intervention can help individuals understand the consequences of excessive internet gaming and smartphone usage and help them control their behaviour (Faust & Prochaska, 2018). Furthermore, interventions can focus on promoting healthy sleep habits, such as

regular sleep schedules, avoiding the use of electronic devices before bedtime, and practicing relaxation techniques (Liu et al., 2022).

Practical Implications

This research study that internet gaming disorder, and smartphone addiction as the risk factor of contributing to insomnia. Hence, this study emphasizes the importance of raising awareness among university students and the general public about the negative consequences of excessive internet gaming and smartphone usage. Parents, educators and healthcare professionals should encourage individuals to monitor and control their smartphone usage to prevent smartphone addiction and cause insomnia. Additionally, this study highlights the need for developing and implementing effective policies such as education and awareness programs to help students understand the negative impact of excessive internet and smartphone usage on their health and well-being and guidelines to promote healthy internet usage and smartphone usage among university students. Furthermore, digital detox programs can be useful in reducing internet gaming addiction and smartphone addiction among university students. Several studies have shown the effectiveness of digital detox programs in reducing internet gaming addiction and smartphone addiction among young adults. For instance, a randomized controlled trial conducted by Lin et al. (2020) found that a six-week digital detox program significantly reduced internet gaming addiction and improved sleep quality among college students in Taiwan. These programs should include counselling and behavioral interventions to help individuals reduce their digital device usage and improve their sleep habits (Mehroof & Griffiths, 2010). Additionally, the study emphasizes the need for developing and implementing educational programs that focus on the healthy use of digital devices, including internet gaming and smartphones. These programs should promote the development of healthy digital habits and educate individuals about the negative consequences of excessive internet gaming and smartphone usage (Liu et al., 2021).

Limitations of the Study

The first limitation is the data collection method employed in this research study, which involved the use of an online self-report questionnaire administered via social media, may have introduced response biases that could affect the validity of the findings. Specifically, social desirability bias may have influenced participants to provide responses

that they perceive as socially acceptable, rather than their true feelings or experiences. This bias can lead to inaccurate data that may hinder the accuracy of the results (Crutzen & Göritz, 2011; Rosenman et al., 2011).

Besides that, the use of non-probability sampling techniques is also one of the limitations in this study. As we apply the purposive sampling method in this study, it limits the generalizability of the findings to the larger population. The inclusion criteria used in the selection of respondents were specific and this subjectivity may have introduced bias in the sample selection process making it difficult for us to draw inferences about the population (Etikan et al., 2016). Research has demonstrated that non-probability sampling methods are less precise in portraying the traits of the broader population, resulting in a sample that is not as representative of the population (Wisniowski et al., 2020).

In addition, in the inclusion and exclusion criteria, we did not mention about those with other psychological disorders such as depression or anxiety which may lead to insomnia. According to research by Carskadon (2011), underlying psychological or psychiatric disorders such as depression, anxiety can contribute to sleep disorders, which may affect the results of studies examining the connection between internet gaming disorder and smartphone addiction with sleep quality. If these disorders are included in the study, it can lead to confounding variables that can impact the study's results. For example, a participant who is experiencing depression or anxiety may have difficulty sleeping due to their underlying psychological condition rather than their level of smartphone addiction or internet gaming disorder. Inclusion and exclusion criteria play a critical role in the selection of participants for research studies. They ensure that the participants are representative of the target population and meet the specific criteria necessary for the study. Therefore, it is essential to include comprehensive inclusion and exclusion criteria in future studies to ensure that the study's results are valid and reliable.

Recommendations for Future Research

In order to overcome the constraints of this research, future research could consider using probability sampling techniques such as stratified random instead of using non-probability sampling techniques, which may result in limited generalizability. The method of probability sampling guarantees that each individual in the population has an equal opportunity to be chosen for the study. Stratified random sampling is one of the probability sampling techniques that can be used to ensure that participants are selected from different

strata of the population, such as age, gender, and socio-economic status. By using probability sampling, researchers can increase the generalizability of their findings to the larger population, which enhances the external validity of the research (Lavrakas, 2008).

Moreover, researchers could use multiple methods of data collection to gather data from different sources, such as interviews or objective measures. This approach can help triangulate the findings and reduce the impact of response biases, which may be introduced when using self-report measures. Using objective measures such as actigraphy, which measures sleep patterns and wakefulness, can provide more accurate data and help to validate the self-reported data.

In addition, including more comprehensive inclusion and exclusion criteria in future studies, such as those with underlying psychological or psychiatric disorders that may cause insomnia, can increase the internal validity of the research. This approach ensures that the sample is more representative of the population of interest, and it also helps to control for potential confounding variables. For example, depression and anxiety are known to be associated with sleep disturbances, and including participants with these disorders in the study may provide a more accurate picture of connection between smartphone addiction, internet gaming disorder, and sleep quality.

Overall, addressing these limitations can help to improve the quality of research and provide more accurate and reliable findings. To improve the comprehension of the association between IGD, smartphone addiction, and sleep quality among university students, it is crucial to take these suggestions into account for future research.

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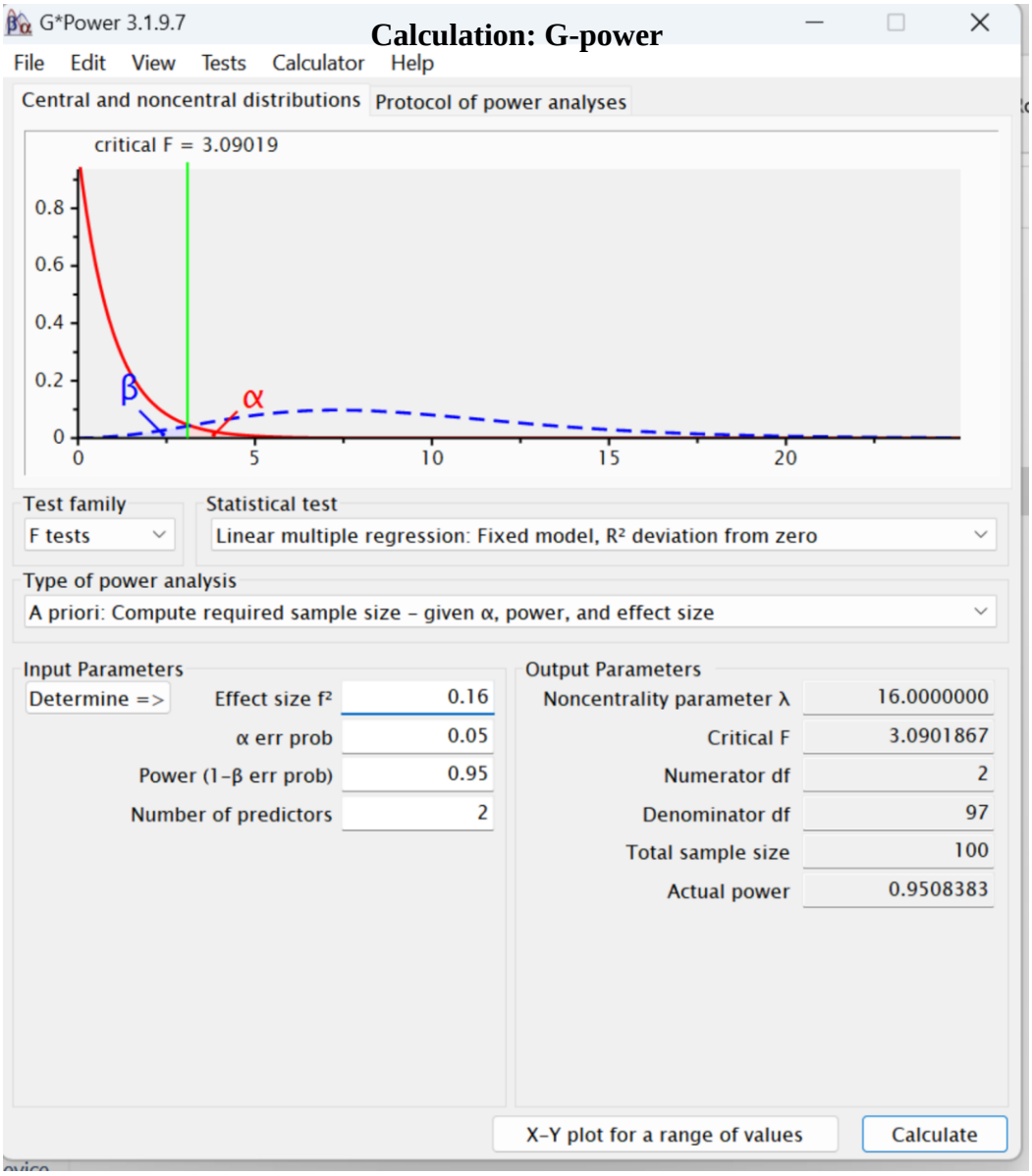
Appendix

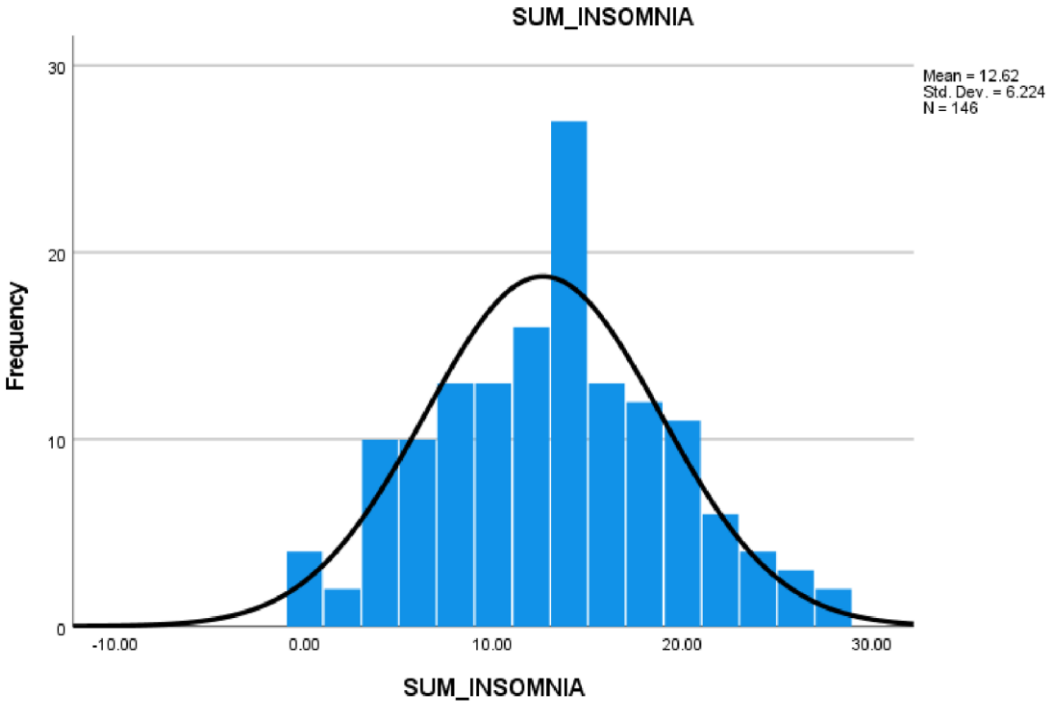
Appendix A: Sample Size

Calculation: G-power

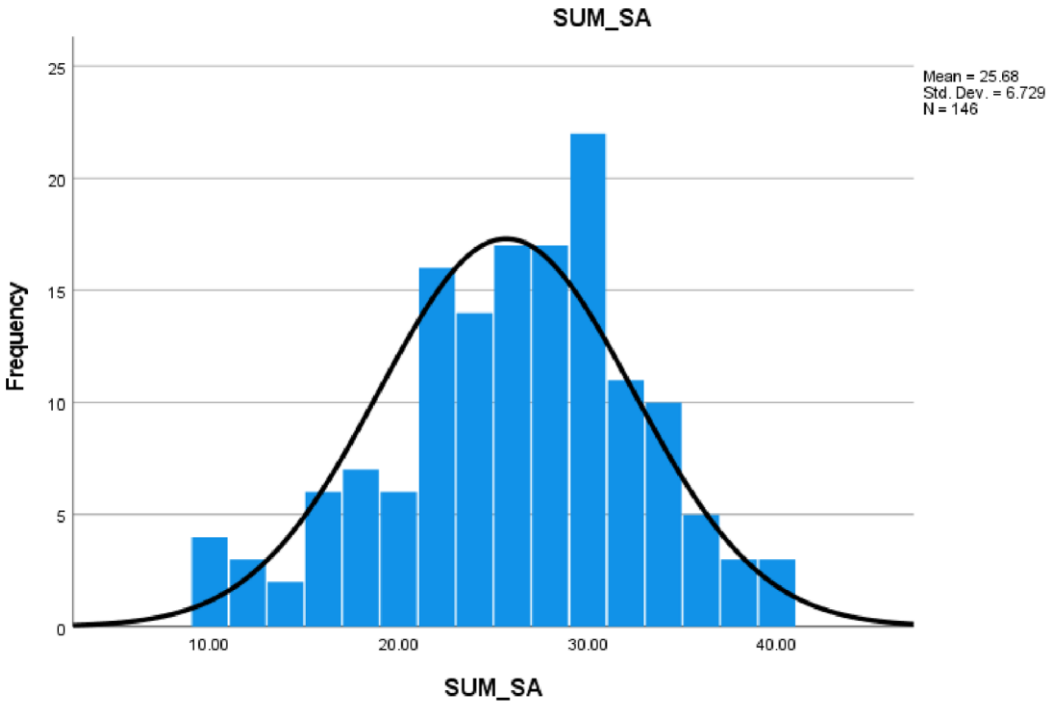


Appendix B: Histograms

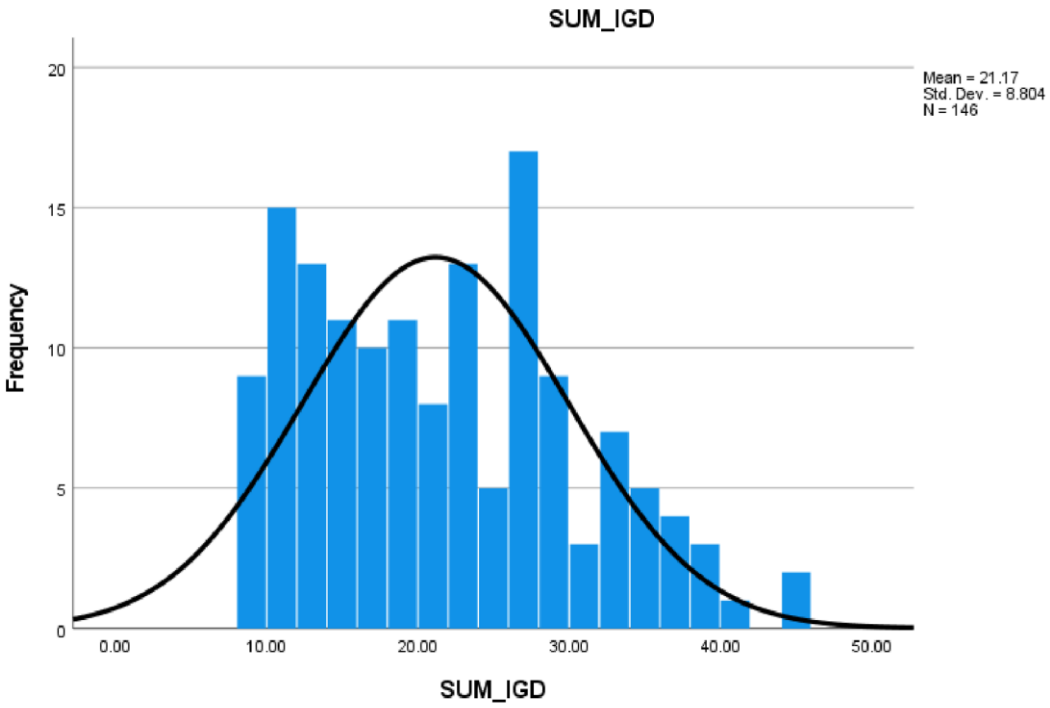
Insomnia



Smartphone Addiction



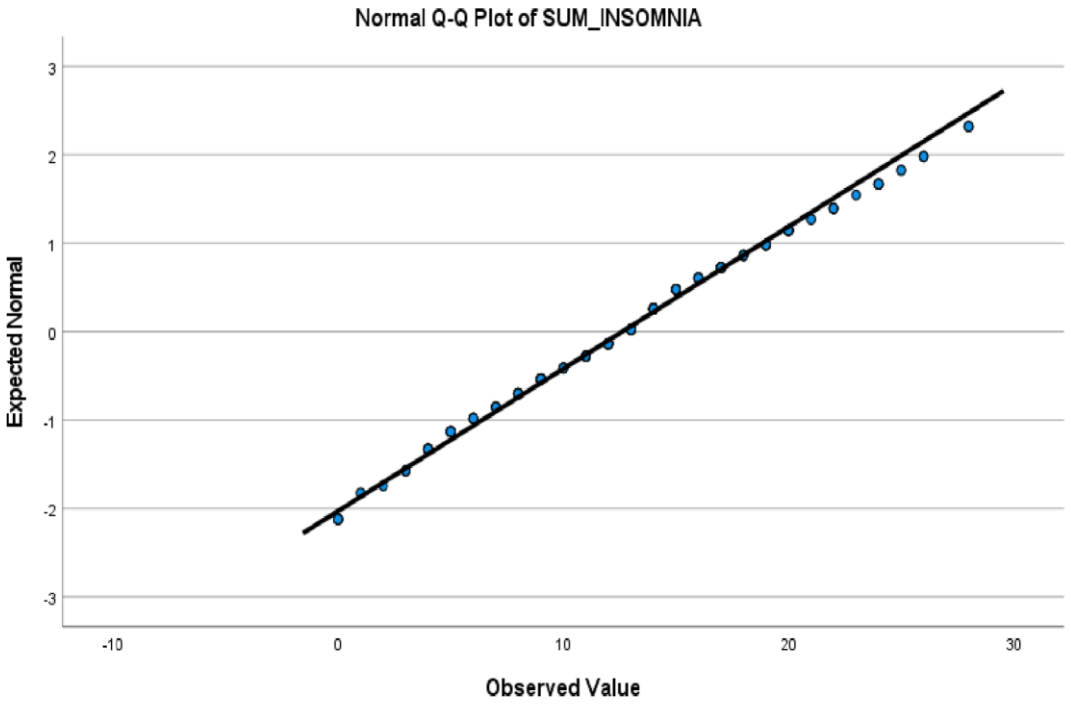
Internet Gaming Disorder



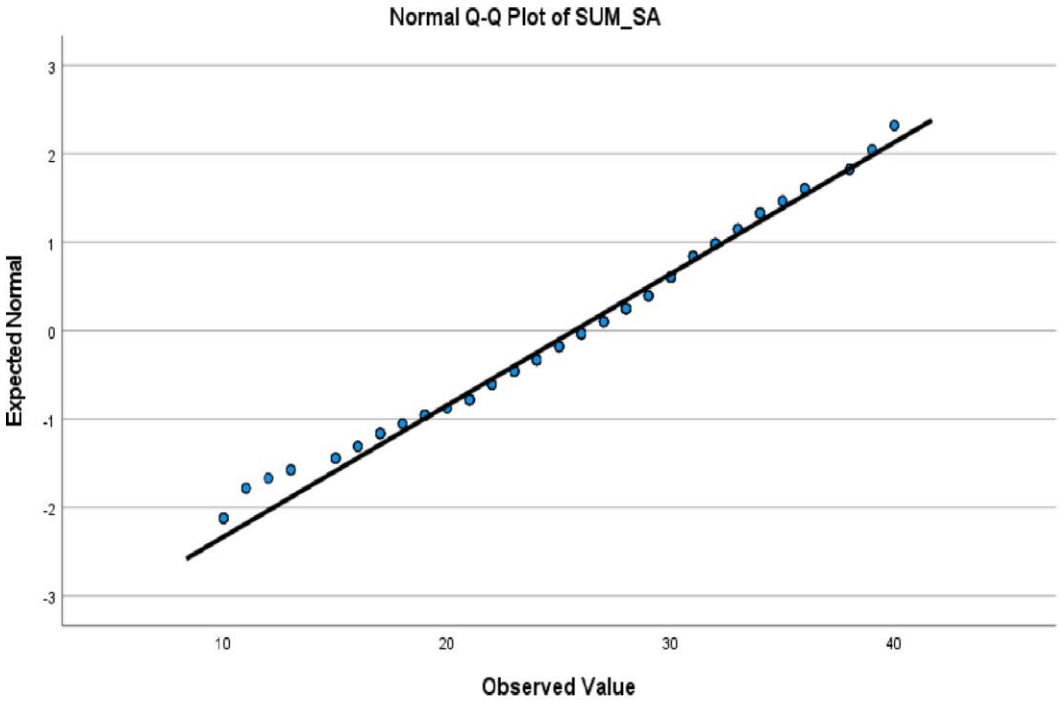
Appendix C: Normality Tests

Q-Q Plot

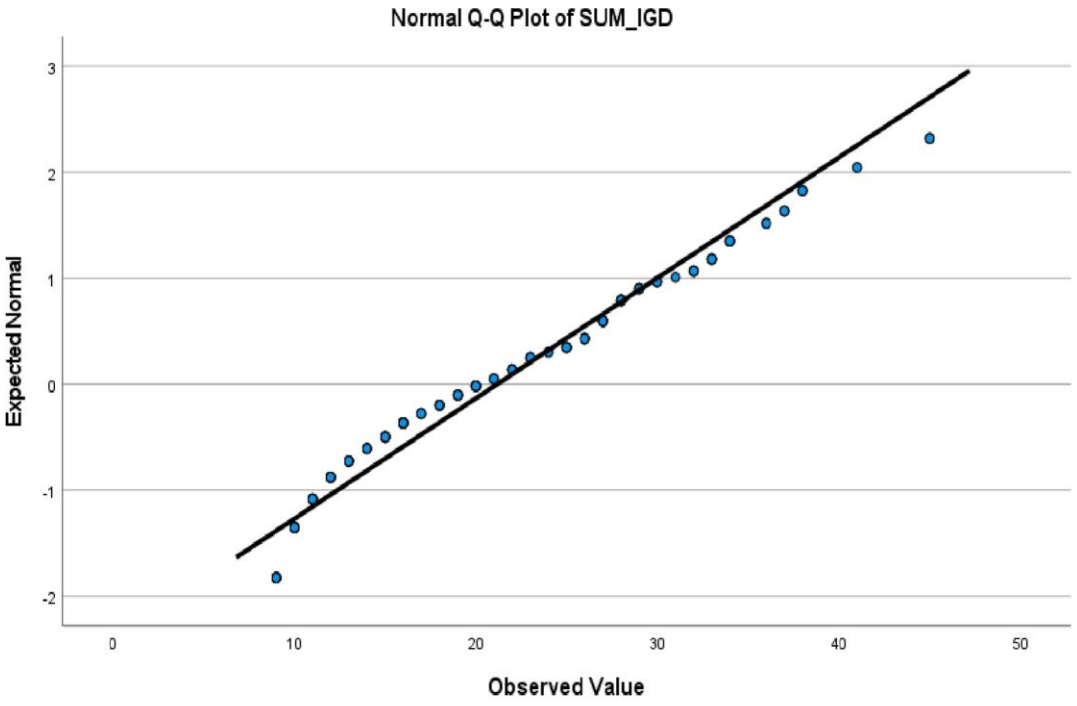
Insomnia



Smartphone Addiction



Internet Gaming Disorder



Kolmogorov-Smirnov (K-S) Test

Insomnia

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SUM_INSOMNIA	0.070	146	0.076	0.988	146	0.223

a. Lilliefors Significance Correction

Smartphone Addiction & Internet Gaming Disorder

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SUM_IGD	0.105	146	0.000	0.951	146	0.000
SUM_SA	0.066	146	0.200*	0.981	146	0.039

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

a. Lilliefors Significance Correction

Variance Inflation Factor (VIF) Values and Tolerance Values

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-0.969	1.711		-0.566	0.572		
	SUM_SA	0.408	0.072	0.441	5.652	0.000	0.774	1.292
	SUM_IGD	0.146	0.055	0.207	2.653	0.009	0.774	1.292

a. Dependent Variable: SUM_INSOMNIA

Durbin-Watson Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.570[a]	0.325	0.315	5.14979	1.899

a. Predictors: (Constant), SUM_IGD, SUM_SA

b. Dependent Variable: SUM_INSOMNIA

Skewness & Kurtosis

Descriptive Statistics

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SUM_SA	146	25.6781	6.72918	-0.338	0.201	-0.161	0.399
SUM_INSOMNIA	146	12.6164	6.22371	0.160	0.201	-0.309	0.399
SUM_IGD	146	21.1712	8.80389	0.468	0.201	-0.577	0.399
Valid N (listwise)	146						

Case Summaries

Case number	Cook's Distance	Mahalanobis Distance
1	0.00254	2.04294
2	0.00011	1.72093
3	0.00300	3.47583
4	0.00024	0.36323
5	0.00098	1.62102
6	0.00168	1.11688
7	0.00038	1.59465
8	0.00287	0.48326
9	0.02066	1.08859
10	0.00062	1.83511
11	0.00001	0.30618
12	0.00136	0.03622
13	0.01996	0.32715
14	0.02186	1.13316
15	0.00098	1.75624
16	0.01481	5.84719
17	0.00052	1.33475
18	0.00782	3.03745
19	0.00020	0.34617
20	0.00672	0.01952
21	0.00350	2.17458
22	0.01577	4.75302
23	0.00056	1.72093
24	0.00038	1.28627
25	0.00139	1.13684
26	0.00004	2.52173
27	0.00819	3.92067
28	0.00001	0.84861

29	**0.00350**	**0.47968**
30	**0.00007**	**0.10571**
31	**0.00034**	**3.65523**
32	**0.00385**	**0.84861**
33	**0.00583**	**3.08252**
34	**0.00287**	**1.83511**
35	**0.00340**	**1.53142**
36	**0.05700**	**2.18984**
37	**0.00488**	**1.51717**
38	**0.00147**	**0.79855**
39	**0.01541**	**3.54678**
40	**0.00805**	**1.82554**
41	**0.00465**	**1.39872**
42	**0.01917**	**1.73039**
43	**0.00191**	**0.13764**
44	**0.00283**	**1.01124**
45	**0.00004**	**11.93701**
46	**0.05918**	**11.18339**
47	**0.00912**	**2.35578**
48	**0.00225**	**2.66078**
49	**0.00045**	**3.47583**
50	**0.00340**	**3.01693**
51	**0.00547**	**1.72378**
52	**0.00934**	**3.67186**
53	**0.00255**	**0.48888**
54	**0.01620**	**0.49239**
55	**0.00001**	**0.66165**
56	**0.00170**	**0.55015**
57	**0.00960**	**1.67309**
58	**0.02133**	**5.84719**
59	**0.00001**	**0.63708**
60	**0.00001**	**0.57691**

61	**0.00996**	**2.35564**
62	**0.00007**	**0.64001**
63	**0.00960**	**2.04294**
64	**0.00287**	**0.29548**
65	**0.00139**	**1.24024**
66	**0.00039**	**0.45425**
67	**0.00985**	**4.16146**
68	**0.00918**	**2.32525**
69	**0.00042**	**0.08338**
70	**0.02387**	**3.55814**
71	**0.00429**	**4.68527**
72	**0.00809**	**0.90902**
73	**0.00708**	**1.00097**
74	**0.00094**	**0.66143**
75	**0.00762**	**0.97238**
76	**0.00049**	**1.75178**
77	**0.00255**	**0.57691**
78	**0.00021**	**1.58715**
79	**0.00234**	**0.58125**
80	**0.02513**	**1.04318**
81	**0.07092**	**1.80575**
82	**0.00488**	**0.57691**
83	**0.00008**	**0.36196**
84	**0.01460**	**0.38618**
85	**0.00322**	**0.31001**
86	**0.00202**	**0.78601**
87	**0.00311**	**0.71417**
88	**0.02186**	**1.25391**
89	**0.00020**	**0.06246**
90	**0.02614**	**2.21875**
91	**0.00049**	**2.26712**
92	**0.05047**	**8.24076**

93	**0.00186**	**2.86948**
94	**0.00571**	**2.23404**
95	**0.00011**	**0.57691**
96	**0.00186**	**0.57691**
97	**0.00019**	**0.09604**
98	**0.00697**	**2.12624**
99	**0.00026**	**3.82844**
100	**0.00062**	**1.79541**
101	**0.00407**	**0.86386**
102	**0.00136**	**1.28627**
103	**0.00044**	**1.66031**
104	**0.00571**	**2.51085**
105	**0.00089**	**0.69828**
106	**0.00040**	**0.00887**
107	**0.00081**	**5.76994**
108	**0.00062**	**0.32084**
109	**0.00011**	**0.57691**
110	**0.04911**	**7.70859**
111	**0.01557**	**5.43120**
112	**0.01073**	**5.01913**
113	**0.02541**	**4.75792**
114	**0.04565**	**7.29448**
115	**0.00178**	**3.85575**
116	**0.00618**	**0.26923**
117	**0.03387**	**6.15017**
118	**0.01124**	**4.15509**
119	**0.00040**	**2.55365**
120	**0.00007**	**0.18927**
121	**0.00287**	**1.52362**
122	**0.00014**	**2.20198**
123	**0.00548**	**0.58125**
124	**0.00147**	**2.77206**

125	**0.00031**	**1.91312**
126	**0.00852**	**1.66031**
127	**0.01858**	**0.49677**
128	**0.00007**	**0.03622**
129	**0.01573**	**3.67186**
130	**0.00001**	**0.84953**
131	**0.00185**	**1.02247**
132	**0.00234**	**0.37344**
133	**0.01124**	**0.30444**
134	**0.00070**	**0.12153**
135	**0.00021**	**0.45642**
136	**0.00691**	**1.98777**
137	**0.01573**	**1.83511**
138	**0.00375**	**0.29898**
139	**0.00774**	**0.16247**
140	**0.00994**	**1.70339**
141	**0.00001**	**0.57691**
142	**0.00821**	**4.09327**
143	**0.00488**	**0.98484**
144	**0.00702**	**6.14016**
145	**0.00004**	**3.02769**
146	**0.00375**	**1.61425**

Appendix D: Linear Regression Model

Smartphone Addiction & Insomnia

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.540[a]	0.292	0.287	5.25662

a. Predictors: (Constant), SUM_SA

b. Dependent Variable: SUM_INSOMNIA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1637.508	1	1637.508	59.261	0.000[b]
	Residual	3979.013	144	27.632		
	Total	5616.521	145			

a. Dependent Variable: SUM_INSOMNIA

b. Predictors: (Constant), SUM_SA

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-0.207	1.722		-0.120	0.904	-3.610	3.196
	SUM_SA	0.499	0.065	0.540	7.698	0.000	0.371	0.628

a. Dependent Variable: SUM_INSOMNIA

Linear Regression

Internet Gaming Disorder & Insomnia

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.417[a]	0.174	0.168	5.67619

a. Predictors: (Constant), SUM_IGD

b. Dependent Variable: SUM_INSOMNIA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	976.968	1	976.968	30.323	0.000[b]
	Residual	4639.552	144	32.219		
	Total	5616.521	145			

a. Dependent Variable: SUM_INSOMNIA

b. Predictors: (Constant), SUM_IGD

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	6.374	1.227		5.195	0.000	3.949	8.800
	SUM_IGD	0.295	0.054	0.417	5.507	0.000	0.189	0.401

a. Dependent Variable: SUM_INSOMNIA

Appendix E: Multiple Linear Regression Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.570[a]	0.325	0.315	5.14979	0.325	34.391	2	143	0.000

a. Predictors: (Constant), SUM_IGD, SUM_SA

b. Dependent Variable: SUM_INSOMNIA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1824.111	2	912.056	34.391	0.000[b]
	Residual	3792.409	143	26.520		
	Total	5616.521	145			

a. Dependent Variable: SUM_INSOMNIA

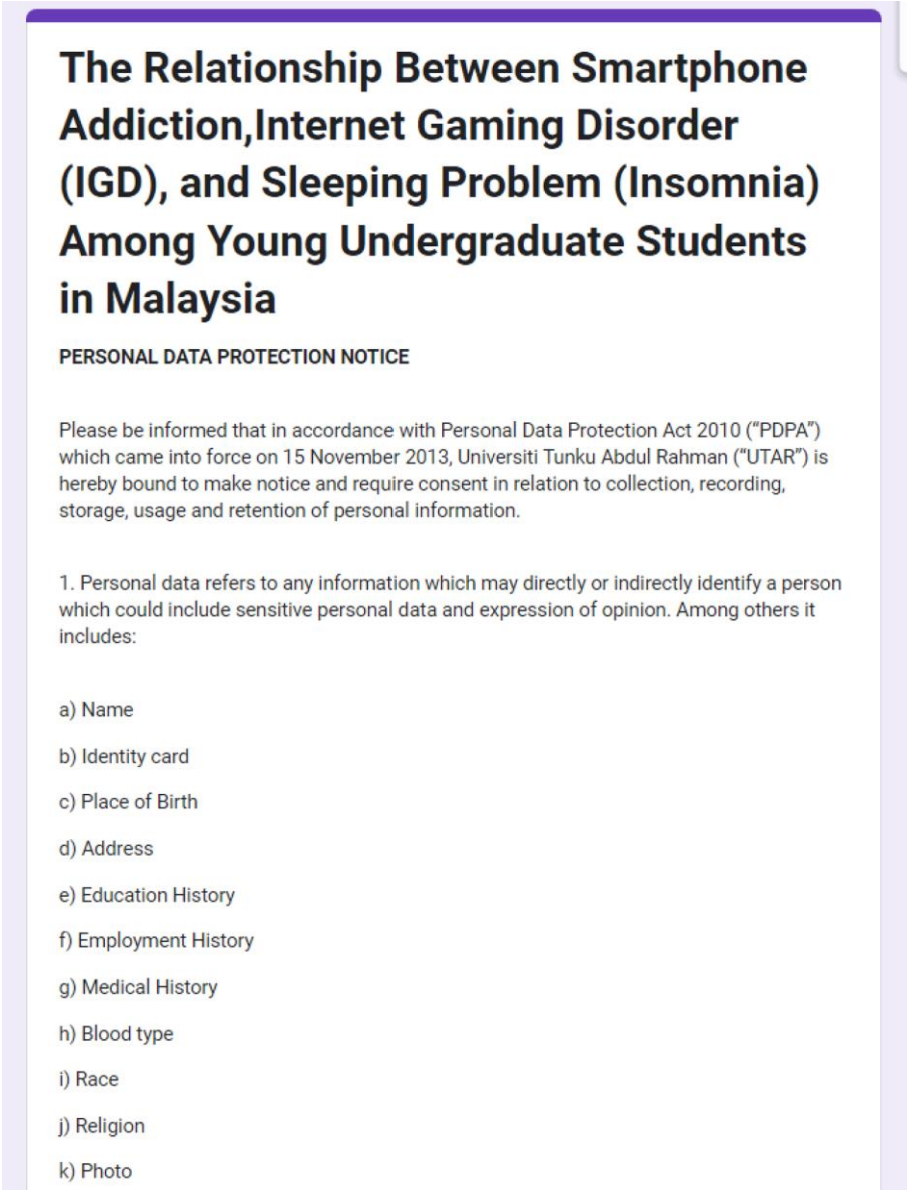
b. Predictors: (Constant), SUM_IGD, SUM_SA

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	-0.969	1.711		-0.566	0.572			
	SUM_SA	0.408	0.072	0.441	5.652	0.000	0.540	0.427	0.388
	SUM_IGD	0.146	0.055	0.207	2.653	0.009	0.417	0.217	0.182

a. Dependent Variable: SUM_INSOMNIA

Appendix F: Online Survey Form



The Relationship Between Smartphone Addiction,Internet Gaming Disorder (IGD), and Sleeping Problem (Insomnia) Among Young Undergraduate Students in Malaysia

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c) Place of Birth

d) Address

e) Education History

f) Employment History

g) Medical History

h) Blood type

i) Race

j) Religion

k) Photo

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2. The purposes for which your personal data may be used are inclusive but not limited to:

a) For assessment of any application to UTAR

b) For processing any benefits and services

c) For communication purposes

d) For advertorial and news

e) For general administration and record purposes

f) For enhancing the value of education

g) For educational and related purposes consequential to UTAR

h) For replying any responds to complaints and enquiries

i) For the purpose of our corporate governance

j) For the purposes of conducting research/ collaboration

3. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

4. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

5. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:

6. By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used in accordance to the terms and conditions in the Notice and our relevant policy.

7. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

8. You may access and update your personal data by writing to us at:

lerkyung@1utar.my - Lerk Yung

bshin505@1utar.my - Shin Bin Shyen

callmeblyh@1utar.my - Liew Yee Hang

bshin505@gmail.com Switch account

* Required

Email *

Your email

Acknowledgement of Notice *

- ◯ I have been notified and that I hereby understood, consented and agreed per UTAR above notice.
- ◯ I disagree, my personal data will not be processed.

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Section A: **Smartphone Addiction**

The following section has 10 questions.

Please read each statement and choose the number which indicates how much the statement applied to you.

- 1 = Strongly disagree
- 2 = Somewhat disagree
- 3 = Somewhat agree
- 4 = Strongly agree

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

	1	2	3	4	
Strongly disagree	○	○	○	○	Strongly agree

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

	1	2	3	4	
Strongly disagree	○	○	○	○	Strongly agree

3. 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

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

	1	2	3	4	
Strongly disagree	○	○	○	○	Strongly agree

5. 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

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

	1	2	3	4	
Strongly disagree	○	○	○	○	Strongly agree

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

	1	2	3	4	
Strongly disagree	○	○	○	○	Strongly agree

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

	1	2	3	4	
Strongly disagree	○	○	○	○	Strongly agree

9. 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

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

	1	2	3	4	
Strongly disagree	○	○	○	○	Strongly agree

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Section B: **Severity of Insomnia**

The following section consists of 2 parts made up of seven questions to rate the **CURRENT** (i.e. LAST 2 WEEKS) severity of your insomnia problem(s).

Part 1 (4 questions)
For each question,
please select the number (0 - 4) that best describes your answer:

1. Difficulty falling asleep *

	0	1	2	3	4	
None	○	○	○	○	○	Very severe

2. Difficulty staying asleep *
(e.g. Unable to sleep from night to morning, keep waking up, etc.)

	0	1	2	3	4	
None	○	○	○	○	○	Very severe

3. Problems waking up too early *

	0	1	2	3	4	
None	○	○	○	○	○	Very severe

4. How **SATISFIED/ DISSATISFIED** are you with your current sleep pattern? *

	0	1	2	3	4	
Very satisfied	○	○	○	○	○	Very disatisfied

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Part 2

Part 2 (3 questions)
For each question, please select the option that best describes your answer

5. How **NOTICEABLE** to others do you think your sleep problem is in terms of impairing the quality of your life? *

- ◯ Not at all noticeable
- ◯ A Little
- ◯ Somewhat
- ◯ Much
- ◯ Very Much Noticeable

6. How **WORRIED/ DISTRESSED** are you about your current sleep problem? *

- ◯ Not at all worried
- ◯ A little
- ◯ Somewhat
- ◯ Much
- ◯ Very much worried/ distressed

7. To what extent do you consider your sleep problem to **INTERFERE** with your daily functioning (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.) currently? *

- ◯ Not at all interfering
- ◯ A little
- ◯ Somewhat
- ◯ Much
- ◯ Very much interfering

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Section C: **Internet Gaming Disorder**

These questions will ask you about your
gaming activity during the past year (i.e., last 12 months). By gaming activity we understand any gaming- related activity that has been played either from a computer/laptop or from a gaming console or any other kind of device (e.g., mobile phone, tablet, etc.) both online and/or offline.

Please read each statement and choose the number which indicates how much the statement applied to you.

- 1 = Never
- 2 = Rarely
- 3 = Sometimes
- 4 = Often
- 5 = Very often

1. Do you feel preoccupied with your gaming behavior? *

(e.g., Do you think about previous gaming activity or anticipate the next gaming session? Do you think gaming has become the dominant activity in your daily life?)

	1	2	3	4	5	
Never	○	○	○	○	○	Very often

2. Do you feel more irritability, anxiety or even sadness when you try to either reduce or stop your gaming activity? *

	1	2	3	4	5	
Never	○	○	○	○	○	Very often

3. Do you feel the need to spend increasing amount of time engaged gaming in order to achieve satisfaction or pleasure? *

	1	2	3	4	5	
Never	○	○	○	○	○	Very often

4. Do you systematically fail when trying to control or cease your gaming activity? *

	1	2	3	4	5	
Never	○	○	○	○	○	Very often

5. Have you lost interests in previous hobbies and other entertainment activities as a result of your engagement with the game? *

	1	2	3	4	5	
Never	○	○	○	○	○	Very often

6. Have you continued your gaming activity despite knowing it was causing problems between you and other people? *

	1	2	3	4	5	
Never	○	○	○	○	○	Very often

7. Have you deceived any of your family members, therapists or others because the amount of your gaming activity? *

	1	2	3	4	5	
Never	○	○	○	○	○	Very often

8. Do you play in order to temporarily escape or relieve a negative mood? *
(e.g., helplessness, guilt, anxiety)

	1	2	3	4	5	
Never	○	○	○	○	○	Very often

9. Have you jeopardized or lost an important relationship, job or an educational or career opportunity because of your gaming activity? *

	1	2	3	4	5	
Never	○	○	○	○	○	Very often

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Section D: **Demographic Information**

Do you currently pursue an undergraduate degree in Malaysia? *

- ◯ Yes
- ◯ No

Gender *

- ◯ Male
- ◯ Female
- ◯ Other: _____

Age *
(e.g. 21)

Your answer

Educational Institution *
(e.g. Universiti Tunku Abdul Rahman)

Your answer

Current Academic Year *
(e.g. Year 1 Semester 1)

Your answer

Undergraduate Programme *
(e.g. Psychology, Accounting, etc.)

Your answer

Ethinicity *

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

Nationality *

Your answer

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