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THE PREDICTIVE ROLES OF SOCIAL ANXIETY, STRESS AND BOREDOM PRONENESS ON SMARTPHONE ADDICTION AMONG UNIVERSITY STUDENTS IN MALAYSIA

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A RESEARCH PROJECT

SUBMITTED IN

PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR

THE BACHELOR OF SOCIAL SCIENCE (HONS) PSYCHOLOGY

FACULTY OF ARTS AND SOCIAL SCIENCE

UNIVERSITI TUNKU ABDUL RAHMAN

SEPTEMBER. 2025

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This research project is submitted in partial fulfilment of the requirements for the Bachelor of Social Science (Hons) Psychology, Faculty of Arts and Social Science. Universiti Tunku Abdul Rahman. Submitted on September 2025.

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ACKNOWLEDGEMENTS

We would like to express our deepest gratitude to our supervisor, Dr. Grace T'ng Soo Ting, for her patience, guidance, and unwavering support throughout these past few months. Her advice and encouragement gave us the confidence to persevere through the challenges we faced. Conducting a final year project was not easy, but with her guidance, we felt reassured that it was achievable. We are sincerely thankful for her kindness, understanding, and forgiveness of our mistakes, which allowed us to grow both academically and personally.

We also extend our heartfelt appreciation to our parents and families for their continuous motivation, encouragement, and understanding throughout this journey. Their support has been a constant source of strength.

Special thanks go to our friends and to one another for their dedication, help, and steady social, moral, and emotional support during the challenging months of completing this project. Having each other by our side made the process less overwhelming and more meaningful.

We are equally grateful to our participants for their willingness to contribute their time in completing our survey. Their responses provided us with valuable insights, without which this research would not have been possible.

Finally, we thank everyone who has, in one way or another, supported and encouraged us throughout this journey. This project could not have been completed without your collective contributions.

SAMANTHA SOONG JIA YIE

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DECLARATION

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

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APPROVAL FORM

The research paper attached here, entitled "The Predictive Roles of Social Anxiety, Stress, and Boredom Proneness on Smartphone Addiction among University Students in Malaysia." prepared and submitted by Samantha Soong Jia Yie and Vaneesha Sauvilei A/P Visvanathan in partial fulfilment of the requirements for the Bachelor of Social Science (Honours) Psychology is hereby accepted.

GRACE

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Abstract

In Malaysia, smartphone addiction has become a significant issue, with the country ranking third worldwide in prevalence. University students are especially vulnerable, given their extensive use of smartphones for academic, social, and personal purposes. Excessive smartphone reliance has been linked to psychological factors such as social anxiety, stress, and boredom proneness. However, limited research has explored how these variables contribute to smartphone addiction within the Malaysian context. Thus, the present study aimed to explore the predictive roles of social anxiety, stress, and boredom proneness on smartphone addiction among Malaysian university students, guided by the Compensatory Internet Use Theory (CIUT). A quantitative, cross-sectional design was employed, and data were collected through an online survey. A total of 113 participants were recruited using purposive and snowball sampling techniques. The inclusion criteria required participants to be (i) Malaysian undergraduates, (ii) aged between 18 and above, and (iii) smartphone users. It was hypothesised that social anxiety, stress, and boredom proneness would positively predict smartphone addiction. The findings revealed that social anxiety and boredom proneness positively predicted smartphone addiction, whereas stress was not a significant predictor. These findings extend the application of CIUT by highlighting its relevance to social anxiety and boredom proneness, but its limitations in explaining stress. The study contributes to the literature on digital well-being and provides practical implications for educators, policymakers, and mental health professionals to design interventions that reduce overreliance on smartphones through addressing underlying psychological factors.

Keywords: social anxiety, stress, boredom proneness, smartphone addiction, university students, Malaysia

Subject area: BF1-990 Psychology

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Abbreviations	
SA	Smartphone Addiction
CIUT	Compensatory Internet Use Theory
SIAS-6	Social Interaction Anxiety Scale-6 Item Form
PSS-10	Perceived Stress Scale
SBPS	Short Boredom Proneness Scale
SAS-SV	Smartphone Addiction Scale-Short Version
α	Cronbach's Alpha
H	Hypothesis
f^2	Effect Size
Q-Q plot	Quantile-Quantile Plot
K-S test	Kolmogorov-Smirnov test
MLR	Multiple Linear Regression
VIF	Variance Inflation Factors
SPSS	Statistical Package of Social Science

Chapter I

Introduction

Background of Study

The country's rapid digitalisation and growing reliance on mobile technology are causing smartphone usage in Malaysia to increase dramatically. By 2020, a significant 87.46% of Malaysians had a smartphone, up from a very low 11.13% in 2010, according to Statista (2024a). This growth trend is anticipated to continue, with penetration reaching around 89.48% by 2025. The high penetration rate suggests smartphones have permeated every aspect of everyday life for all demographics. Still, university students are especially affected because they frequently use smartphones for social, intellectual, and recreational purposes (Radzlan et al., 2023).

Smartphone use is particularly common among university students, making it a vital tool for social interaction and academic work. Despite the advantages, there has been growing worry about the possibility of excessive use, sometimes known as "smartphone addiction." However, this growing dependence has given rise to smartphone addiction, often referred to as "nomophobia," "pathological smartphone use," "mobile phone dependence," or "compulsive mobile phone overuse" (Lin et al., 2014; Liu et al., 2022). A growing attention has been given to the field of smartphone addiction, social anxiety, stress, and boredom. These are three variables that are often linked to smartphone addiction because smartphones can provide students with momentary relief when facing these provoking feelings. This coping strategy might result in repetitive patterns of use that exacerbate pre-existing stress or anxiety (Zhou & Shen, 2024; Zsido et al., 2021).

University students in Malaysia, a nation with a high smartphone penetration rate, are especially susceptible to the negative consequences of smartphone addiction. Parasuraman et al.

(2017) found that Malaysian students reported significant levels of problematic smartphone use, often linked to academic difficulties and elevated psychological stress. According to Elhai et al. (2016), students who experience social anxiety, stress, or boredom may be more susceptible to smartphone addiction. Social anxiety, a disorder characterised by fear and avoidance of social situations due to concerns about criticism or unfavourable assessment, particularly affects university students (American Psychiatric Association, 2013). Smartphones provide a digital "safe space" for students who struggle with social anxiety, allowing them to converse through screens, avoid in-person encounters, and use social media in place of face-to-face conversations (Lee & Stapinski, 2012). Although momentarily reassuring, this digital haven may cause increased anxiety and a maladaptive reliance on smartphones as a coping strategy (Kruchten, 2021).

Another leading cause of smartphone addiction is stress, especially for university students who frequently deal with emotional, financial, and academic demands. Students may experience significant stress due to the pressures of academics, assessments, social expectations, and worries about their future careers. As a result, they may turn to readily available outlets such as smartphones for solace (Samaha & Hawi, 2016). Unlike traditional stress-reduction techniques that may require more work or resources, smartphones provide a quick and convenient escape with various distraction possibilities, such as games, social media, streaming services, and more, available at any time and location. According to research done by Elhai et al. (2017a), students who are under a lot of stress are more likely to use their phones excessively as a coping strategy to control or momentarily escape from their negative feelings. Interacting with smartphone content, which can offer a sensation of control or divert attention from overpowering emotions, can instantly but briefly relieve stress. As students use their phones more frequently to avoid

directly dealing with stress, their dependence on them to reduce stress over time may lead to chronic use. As the behaviour of utilising the gadget as an emotional getaway becomes established, this pattern may eventually result in smartphone addiction (Wang et al., 2015).

Particularly among university students, boredom proneness—the potential to feel bored often and intensely—strongly predicts smartphone addiction. High boredom proneness people frequently have trouble finding interesting or fulfilling activities; therefore, they look for convenient and quick ways to get their fill of stimulation (Bench & Lench, 2019). Smartphones provide students with instant entertainment, offering various options such as social networking, streaming services, games, and news. Smartphones are a tempting, almost natural choice for people who become bored easily because of this instantly accessible source of stimulation. Keough et al. (2018) suggest that bored individuals often use their phones to pass the time and suppress the negative emotions associated with boredom, such as agitation and annoyance. With continuous alerts, scrolling feeds, and fresh updates, the interactive aspect of smartphone information can become quite captivating, further solidifying smartphone use as a useful, short-term solution to pass the time when bored. This conduct can eventually result in smartphone addiction, as people depend more and more on their gadgets to pass the time during even brief periods of boredom, thereby solidifying a pattern of dependence (Cheever et al., 2014).

Problem Statement

In Malaysia, smartphone addiction is particularly concerning. The country ranks third globally in smartphone addiction rates, following China and Saudi Arabia (Statista, 2024b). As of the third quarter of 2023, 98.4% of the Malaysian population owned a smartphone, up from

97.6% in 2022, with this number expected to rise further by 2025 (Siddharta, 2024). While smartphone ownership spans all age groups, younger generations are more likely to own and use smartphones, with only 30% of individuals aged 65 and older owning one. Mobile messaging, photography, and social networking are the most common activities among Malaysian smartphone users (Siddharta, 2023).

Smartphones have swiftly become one of the most pervasive electronic devices worldwide, comparable to essential items such as keys and cash (Emanuel et al., 2015). According to Elhai et al. (2017b), smartphone addiction can have detrimental effects on social interactions, academic performance, mental health, and behavioural patterns. Research on the psychological aspects of smartphone addiction has thus become crucial, particularly for university students who may be more vulnerable as a result of social and academic demands (Samaha & Hawi, 2016). Their widespread usage spans all age groups, showcasing advancements in science and technology. These terms collectively describe problematic smartphone usage, characterised by an uncontrollable urge to use smartphones, often driven by excessive Internet use, which triggers dopamine release, reinforcing a cycle of dependency (Chen et al., 2023).

The pathological use of smartphones resembles Internet addiction, characterised by compulsive interaction with a digital device and a lack of control over usage (Billieux et al., 2006). Smartphone addiction has been identified as a behavioural addiction involving an inability to regulate usage (Demirci, 2015; Ghosh, 2020; Pavithra et al., 2015), particularly among younger populations who are especially vulnerable to its effects (Chóliz, 2010). In Malaysia, 46.9% of students exhibit addictive behaviours such as intense desire, compulsive use,

and withdrawal symptoms (Alavi et al., 2012; Ching et al., 2015). Screening studies report a wide prevalence range, from just over 1% to as high as 35% (Ghosh, 2020).

Studies suggest that smartphone addiction is associated with significant functional impairments (Panova & Carbonell, 2018). Academically, it can lead to challenges (Hawi & Samaha, 2016), disruptions in attention and focus, and hindered performance (Xie et al., 2018). Occupationally, reduced work performance and physical discomfort, such as wrist pain, neck discomfort, and impaired vision, are common (Kim et al., 2018; Xie et al., 2018). Interpersonally, it contributes to difficulties due to fewer face-to-face interactions (Murdock, 2013), negatively impacting relationships and daily functioning (Hwang et al., 2012). Additionally, mental health issues such as anxiety (Demirci et al., 2015; Kwon et al., 2013), depression (Augner & Hacker, 2011; Hwang et al., 2012), and stress (World Health Organization, WHO, 2015; Zhang et al., 2022) are commonly linked to smartphone addiction.

Physical consequences are also significant, including fatigue (Guo et al., 2019), poor sleep quality (Xie et al., 2018), and emotional difficulties that can exacerbate problematic peer relationships (Wang et al., 2017). These concerns are heightened among university students, who heavily rely on smartphones for academic and personal purposes (Raza et al., 2020). Factors such as convenience, social needs, and societal influences drive excessive smartphone usage (Suki, 2013). Smartphones' high-quality performance, rapid access to information, and social networking features make them indispensable, further compounding their addictive nature (Mukhdoomi et al., 2020). Given these trends, mental health experts predict that smartphone addiction will become one of the leading forms of technology addiction in the 21st century (Abi-Jaoude et al., 2020; Chóliz, 2010; Lin et al., 2017).

The rise in smartphone addiction has led to extensive global research, with many studies exploring its relationship with social anxiety, particularly among university students. Research has been conducted across various nations (e.g., Abid et al., 2023; Darcin et al., 2016; Khan et al., 2021; Lepp et al., 2013; Liu et al., 2023; Thatkar et al., 2021). Additionally, some studies have focused on adolescents (Faiz et al., 2023; Kong et al., 2020; Primadiana et al., 2019), while others have examined adults (Annoni et al., 2021; Lee & Stapinski, 2012). However, limited research in this area has been conducted in the Malaysian context, where existing studies have primarily focused on general associations, such as the role of social anxiety in predicting smartphone addiction alongside loneliness, quality of life, and depression (Amin et al., 2024; Gananda et al., 2021; Ithnain et al., 2018; Lim et al., 2023; Sahimi et al., 2022). Notably, these local studies have not extensively explored social anxiety as a direct predictor of smartphone addiction, with most research approaching it as a mediator instead (Bi et al., 2022; Pera, 2020; Song et al., 2024a; Sun et al., 2023; Wang et al., 2024). Furthermore, key aspects such as the unique contextual and cultural factors influencing Malaysian university students remain underexplored, as emphasised by Amin et al. (2024). This highlights the need for research focusing on the direct predictive role of social anxiety on smartphone addiction to address these gaps in the local literature and provide insights for targeted interventions.

Another widely recognised factor contributing to smartphone addiction is stress, emphasising how stress fuels excessive smartphone usage as a coping strategy (Nordin & Martin, 2022). People frequently use smartphones to manage their emotions and avoid stress, according to studies done in several nations, such as the United States, South Korea, and India (e.g., Ekambaram, 2023; Park & Yoo, 2023; Thomée, 2018). However, there are currently few studies conducted in Malaysia on stress as a predictor of smartphone addiction in university students.

Existing research, however, emphasises how stress plays a significant role in determining smartphone reliance. For instance, Nordin and Martin (2022) discovered that problematic smartphone use is more common among Malaysian students who are under academic stress. Similarly to Samat et al. (2022), regarding these findings, a large portion of Malaysian research looks at stress in combination with other factors, such as social anxiety and life satisfaction, rather than focusing just on how stress directly predicts smartphone addiction (Nordin and Martin, 2022; Sahimi et al., 2022). Additionally, Malaysian cultural elements, such as social standards and family expectations, may make students feel more stressed and influence their smartphone use patterns in ways that deviate from universal patterns. This emphasises how urgently more research is needed to determine how stress predicts smartphone addiction on its own in Malaysia's distinct academic and cultural setting.

On top of that, due to people's inclination to seek out excitement and escape monotony, boredom proneness has become a strong predictor of smartphone addiction. People who are bored are more likely to engage in compulsive behaviours on digital platforms to avoid the discomfort of inactivity, according to international studies that consistently show a strong correlation between problematic smartphone use and boredom (Camerini et al., 2023; Leung, 2020). Research on boredom proneness as a predictor of smartphone addiction is rare in Malaysia, yet it is crucial to consider how quickly university students are using smartphones. Boredom has been mentioned as a contributing factor to smartphone reliance in studies such as those by He et al. (2022) and Gananda et al. (2021), but it has not been identified as a key variable. In Malaysia, cultural variables could also influence behaviours that are prone to boredom. As stated in previous studies, social interaction is highly valued in Malaysian society due to its collectivist orientation, and the smartphone is a key tool for preserving these

relationships. Since people use devices to maintain their social networks as well as for entertainment, this cultural oddity may link boredom and smartphone addiction more severely (Lim et al., 2023). Moreover, in response to boredom, utilising a smartphone frequently might create hard-to-break habits that can eventually lead to addiction. Investigating this connection can help develop treatments meant to promote healthier responses to boredom.

Therefore, this study aims to bridge this gap in understanding by investigating the predictive effects of social anxiety, stress, and boredom proneness on smartphone addiction, thereby filling the gap in localised studies in Malaysia and enhancing the psychological literature, while establishing a basis for future research and customised interventions for Malaysian university students.

Research Question

1. Do social anxiety, stress, and boredom proneness significantly predict smartphone addiction among university students in Malaysia?

Research Objectives

1. To examine the predictive effects of social anxiety, stress, and boredom proneness on smartphone addiction among university students in Malaysia.

Research Hypotheses

***H*$_1$:** Social anxiety positively predicts smartphone addiction among university students in Malaysia.

***H_2*:** Stress positively predicts smartphone addiction among university students in Malaysia.

***H_3*:** Boredom proneness positively predicts smartphone addiction among university students in Malaysia.

Significance of Study

This study examines smartphone addiction using the framework of Contemporary Internet Use Theory (CIUT). According to CIUT, personal-psychological requirements, emotional states, and environmental circumstances influence how people use smartphones, which might result in maladaptive behaviours in some situations (Fabio et al., 2022). In line with CIUT, this study investigates the functions of social anxiety, stress, and boredom proneness, which are psychological conditions that may motivate excessive smartphone usage to control emotions, stimulate the mind, or prevent unpleasant emotions. Current research frequently emphasises broad emotional dimensions such as loneliness and depression, with little consideration of how stress or boredom proneness particularly predicts problematic smartphone addiction (Nordin & Martin, 2022). The study offers a deeper understanding of how unfulfilled psychological and emotional needs result in compulsive behaviours by placing these predictors within CIUT. This is especially important in a collectivist culture like Malaysia, where smartphones are essential for sustaining social and academic life (Lim et al., 2023).

Apart from that, the study can potentially make a significant contribution to future research regardless of research databases, sample data, research methodology, and study limitations, which tends to help the researchers make more progress on the smartphone addiction research topic. Munusamy and Ghazali (2022) claim that while previous research focused on the

need for individual self-control in overcoming this challenging addiction, there are not many studies evaluating boredom proneness and CIUT with smartphone addiction. As a result, the study may help future investigations identify the many facets of smartphone addiction. Policymakers might also profit from the research findings when developing policies that attempt to decrease university students' addicted conduct (Şan et al., 2024).

Moreover, the results of the study may provide useful information for treating smartphone addiction among Malaysian university students. Comprehending the predictive functions of social anxiety, stress, and boredom proneness might help mental health professionals create focused therapies. For example, in keeping with the CIUT principles, therapy interventions might include social skills training, stress management, and boredom-reducing activities (Samaha & Hawi, 2016). Additionally, the outcomes of the study add to the body of knowledge on smartphone addiction, laying the groundwork for further research and giving legislators data to create frameworks or standards that address this problem among university students. The results of the study may also assist policymakers in establishing policies that seek to decrease university students' addictive behaviour. Lastly, by developing a better awareness of the difficulties students encounter, families and communities may gain benefits from these insights by being better equipped to help them and encourage better behavioural habits. This study emphasises how crucial it is to treat smartphone addiction holistically to improve university students' mental health, academic performance, and social well-being.

Conceptual Definition

Social Anxiety

Social anxiety is defined as a persistent apprehension over social interactions, resulting either from a fear of a negative evaluation or a belief that one's presence would induce discomfort in others (Heimberg et al., 2014; James et al., 2023). Individuals with social anxiety often encounter increased self-consciousness, anxiety, or uneasiness in social environments, leading to avoidance behaviours that disrupt everyday activities (e.g., employment, education, and interpersonal relationships). Symptoms may include physiological reactions such as perspiration, tremors, tachycardia, and respiratory difficulties (Jefferson, 2001).

Stress

Stress is a psychological condition characterised by mental strain and pressure, resulting in feelings of overload and fatigue that may adversely affect physical and mental health across all age groups and ethnicities (American Psychological Association, 2018). Although moderate stress may enhance motivation and adaptability, prolonged high stress can result in significant bodily, psychological, and social problems (Tucker et al., 2008).

Boredom Proneness

Boredom proneness is a persistent feature marked by recurrent and profound feelings of boredom, often resulting in adverse psychological consequences (Mugon et al., 2020). Individuals with a high propensity for boredom often suffer increased severity of boredom due to many antecedents, including insufficient stimulation or novelty (Tam et al., 2021).

Smartphone Addiction

Van Rooij and Prause (2014) define smartphone addiction (SA) as a behavioural addiction characterised by obsessive use, mood tolerance, withdrawal symptoms, and conflicts resulting from excessive use despite adverse outcomes. Individuals with smartphone addiction exhibit frequent checking behaviours and exhibit strong reactions to messages (Cha & Seo, 2018). This often leads to significant social, psychological, and physical issues, such as disrupted relationships, anxiety, and sleep difficulties (Heron & Shapira, 2004).

Operational Definition

Social Anxiety

Social anxiety is assessed using the Social Interaction Anxiety Scale, 6-Item Form (SIAS-6), created by Fergus et al. (2014) and derived from the Social Interaction Anxiety Scale (SIAS) by Mattick and Clarke (1998). The SIAS-6 is a self-report questionnaire designed to evaluate social anxiety in the context of social interactions. It consists of six items, assessed on a 5-point Likert scale, from 0 (*not at all characteristic or true of me*) to 4 (*extremely characteristic or true of me*). The total score may vary from 0 to 24, with higher scores indicating higher levels of social interaction anxiety.

Stress

Stress will be measured using the Perceived Stress Scale (PSS-10) created by Cohen and Williamson (1988), a ten-item self-administered questionnaire. The items are rated on a 5-point Likert scale from 0 (*never*) to 4 (*very often*), resulting in an overall score ranging from 0 to 40.

Higher scores indicate more perceived stress in the last month, illustrating the degree to which respondents regard their lives as unpredictable, uncontrolled, and overwhelming.

Boredom Proneness

Boredom proneness is assessed using the Short Boredom Proneness Scale (SBPS) created by Struk et al. (2017). The self-administered questionnaire consists of eight items, evaluated on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The overall score varies from 1 to 56, with higher numbers indicating an increased propensity for boredom proneness.

Smartphone Addiction

Kwon et al. (2013) developed the Smartphone Addiction Scale-Short Version (SAS-SV) to measure smartphone addiction. The SAS-SV is a ten-item self-report questionnaire. The items are then rated on a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The overall score can range from 10 to 60, with higher scores indicating greater levels of smartphone addiction.

Chapter II

Literature Review

Social Anxiety and Smartphone Addiction

Numerous studies have examined the association between social anxiety and smartphone addiction (SA) (Annoni et al., 2021; Khan et al., 2021; Kong et al., 2020; Sun et al., 2023). Research consistently finds that social anxiety is positively associated with SA (Kim & Koh, 2018; Lim et al., 2023; Sahimi et al., 2022; Shen et al., 2019; Turgeman et al., 2020). Individuals with social anxiety have an intense fear of actual social interactions and often exhibit shyness, nervousness, embarrassment, fear, and other unpleasant feelings while communicating with others (Ashbaugh et al., 2010). According to Caplan (2007), individuals with higher levels of social anxiety are more inclined to prefer online over offline social interactions, which can lead to smartphone addiction. Similarly, Lee and Stapinski (2012) argue that socially anxious individuals perceive smartphone communication as a secure mode of engagement, resulting in excessive smartphone usage in social situations.

A recent study by Sahimi et al. (2022) has indicated that socially anxious individuals may choose offline activities but use smartphones as coping mechanisms. In contrast, Elhai et al. (2020) found that non-social smartphone functions, including gaming and internet surfing, exhibit a stronger correlation with social anxiety than social functions like texting or calling, a finding where Reid and Reid (2007) argued the opposite.

The role of smartphones as platforms for social networking applications, including Facebook, Instagram, and WhatsApp, demonstrates that excessive smartphone usage is associated with elevated levels of social media use, which leads to smartphone addiction (Lim et al., 2023). Similarly, Salehan and Negahban (2013) found that the use of mobile social

networking applications is a significant predictor of smartphone addiction. Studies have found that individuals with social anxiety often engage extensively with smartphones for social networking (Darcin et al., 2016), particularly text-based communication or making phone calls as a means to evade distressing social situations and gain a sense of control over their interactions (Pugh, 2017), which ultimately leads to excessive smartphone usage. Furthermore, individuals exhibiting heightened social anxiety symptoms may be more inclined to often visit their social network accounts using smartphones (Darcin et al., 2016) to manage their anxiety and avoid confronting aspects of their behaviour or appearance in face-to-face interactions (Sapacz et al., 2016; Turgeman et al., 2020).

While the use of smartphones for social interaction and entertainment contributes to overuse (Burwell et al., 2018), individuals who primarily use their devices for news consumption experience fewer adverse effects (Pera, 2020). According to Ha et al. (2008) and O'Day and Heimberg (2021), individuals with social anxiety often rely on smartphones as a substitute for face-to-face interaction in social settings. University students, in particular, are susceptible to smartphone addiction, as they represent a significant population of smartphone users (Amin et al., 2024). Lee and Stapinski (2012) suggest that university students tend to favour smartphones for communication, as it allows them to avoid direct interpersonal interactions, resulting in a pronounced reliance on smartphones (Xiao & Huang, 2022). University students exhibiting elevated social anxiety often possess inadequate social skills and employ maladaptive coping mechanisms, resulting in adverse social consequences and addictive behaviours, such as smartphone addiction (Bozoglan et al., 2013).

Stress and Smartphone Addiction

Stress is a major contributing factor to smartphone addiction, according to several studies that have examined the connection between stress and smartphone addiction (Samaha & Hawi, 2016; Samat et al., 2022; Wang et al., 2015). University students frequently suffer from stress, a psychological condition brought on by internal or external pressures, as a result of their obligations, social obstacles, and academic expectations (Córdova et al., 2023; Slimmen et al., 2022). Studies regularly show that people who are under more stress are more likely to use smartphones as a coping strategy, which frequently results in addictive behaviours (Elamin et al., 2024; Samaha & Hawi, 2016).

An addiction to smartphones might arise as a result of general stress. People who are under stress may use their smartphones as an instant source of solace, playing games, perusing social media, or streaming videos to forget about their problems (Nordin & Martin, 2022). According to Elamin et al. (2024), smartphones offer a sense of control and diversion, which can develop into a habitual reaction to stress. But over time, this need can contribute to more stress, leading to a vicious cycle of dependency. These findings are supported by research done in Malaysia, which shows that stressed university students commonly display signs of smartphone addiction (Amin et al., 2024). These students frequently use smartphones to avoid dealing with their financial and academic difficulties since they feel overburdened by them. In similar terms, Arumugam et al. (2020) discovered that students who overuse smartphones for amusement and social approval, aiming to reduce stress momentarily but cause addiction over time.

Most individual's coping mechanisms are shaped by stress, which also affects how they use their smartphones. According to Wang et al. (2015), students who are under a lot of stress are more prone to utilising unhealthy coping strategies, such as using smartphones excessively. For

instance, students frequently engage in virtual interactions or games in an attempt to escape from their stresses and obtain quick pleasure rather than addressing the underlying reasons for their stress (Islam & Rabbi, 2024). This conduct is consistent with research by Samaha and Hawi (2016), who contend that these coping strategies can worsen symptoms of stress and harm mental health.

Furthermore, the term "technostress" is crucial to grasping this occurrence. Compulsive smartphone use is exacerbated by technostress, which occurs when people feel overpowered by their reliance on technology (Yusuf et al., 2024). Since smartphones have become a necessary part of everyday life, university students usually express guilt or anger over the amount of time they spend using them, which raises their stress levels and encourages addictive behaviours (Córdova et al., 2023).

Cultural and societal expectations are a major source of stress for students in Malaysia. Students frequently experience greater pressure to perform well academically and professionally because of Malaysian culture's collectivist structure (Toh et al., 2022). As a result of this stress, numerous people use smartphones to unwind or look for approval from others through social media interactions (Sahimi et al., 2022). According to research by Amin et al. (2024), Malaysian university students who were struggling financially or adjusting to city life were more likely to show symptoms of smartphone addiction. These students' reliance on smartphones is maintained because they frequently utilise their devices as a source of comfort or diversion.

Addiction to smartphones brought on by stress can have a significant impact on students' general well-being. Overuse of smartphones exacerbates psychological stress reactions such as anxiety, agitation, and difficulty focusing (Tu et al., 2023). According to Mahat et al. (2023),

students in Malaysia commonly use smartphones during study sessions or social events, which hinders their capacity to concentrate or form meaningful connections with others.

Boredom Proneness and Smartphone Addiction

One of the primary manifestations of smartphone addiction is boredom proneness, which is characterised as a condition of dissatisfaction and restlessness brought on by a lack of interest in or involvement with one's surroundings (Vodanovich, 2003). Bored people frequently look for stimulation to make them feel more engaged, and smartphones are a convenient and entertaining way to pass the time (Kim et al., 2016). With their many features, smartphones offer a quick fix for boredom by giving users constant access to social media, games, motion pictures, and other distractions. This convenience frequently turns into obsessive smartphone use, which ultimately leads to addiction, for people who are prone to boredom (Munusamy & Ghazali, 2022).

According to Alotaibi et al. (2022), individuals who are bored often are more prone to use their smartphones habitually. Arumugam et al. (2020) contend that because smartphones offer instant access to engaging and amusing information, there is a positive correlation between harmful smartphone behaviours and boredom proneness. Consistently, Bench and Lench (2019) have reported that students with high levels of boredom proneness frequently reported using their smartphones excessively during unstructured times like waiting or travelling. These behaviours might eventually turn into addictive tendencies.

University students who are easily bored are especially vulnerable to smartphone addiction where smartphones are ingrained in their daily lives. According to Goh et al. (2018), Malaysian students regularly use smartphones to occupy time when they are bored and also noted that typical diversions include gaming, social media browsing, and streaming. These

actions may lead to a dependence on smartphones, especially in settings with few other options for stimulation.

The psychological processes that underlie smartphone addiction linked to boredom are based on the need for instant satisfaction and the need to avoid discomfort. Boredom-prone individuals exhibit a low threshold for monotony and frequently turn to exciting activities for instant gratification (Vodanovich, 2003). Smartphones are the perfect tool for this alleviation because of their numerous functions. Camerini et al. (2023) pointed out that users may easily avoid boredom because of smartphones' instantaneous content availability, which reinforces recurrent usage habits that might result in addiction. In addition, those who are prone to boredom frequently struggle with self-control, which makes their dependence on smartphones much worse (Kim et al., 2016). Based on Leung (2020), boredom-prone individuals may find it difficult to stop using their smartphones, even if it interferes with their daily obligations or causes them grief. A loop of overuse is maintained by this lack of self-control, making smartphones an ideal remedy for boredom.

Students who are prone to boredom frequently display particular smartphone usage tendencies. According to Seo and Ray (2019), those who are highly prone to boredom frequently indulge in "mindless scrolling," which is the practice of spending hours on social media or video platforms without any particular goal in mind. This behaviour is consistent with research by Leung (2020), who contends that smartphones offer a steady flow of original information that meets the requirement for stimulation in people who are inclined to become bored.

The association between boredom proneness and smartphone addiction is significantly shaped by cultural and environmental variables (Li et al., 2023). Smartphones are being used as a boredom reliever more commonly in Malaysia considering their widespread availability and the

country's high level of digital connectivity (Radzlan et al., 2023). University students are also prone to boredom considering that they frequently have unstructured schedules and minimal recreational options, which leads to smartphone addiction.

Theoretical Framework

Based on Kardefelt-Winther (2014a), Compensatory Internet Use Theory (CIUT) states that people use the Internet (or, in this case, smartphones) as one means of coping with compensation due to negative feelings or unsatisfied psychological needs. According to CIUT, when people have problems, whether social anxiety, stress, or boredom, they instantly turn to digital devices to dissipate or flee from those emotions as a coping mechanism, which can offer a momentary sensation of comfort, diversion, or contentment (Kardefelt-Winther, 2014b). This behaviour becomes increasingly vital when there are few or no offline coping mechanisms available.

According to CIUT, people with social anxiety are more likely to use smartphones to avoid in-person interactions, which they frequently find distressing and uncomfortable. Socially nervous individuals may rely on the controlled environment of smartphones to connect through text or social media, skipping the hazards of real-time spoken conversation (Kardefelt-Winther, 2014b). This over-reliance becomes compensatory, as smartphones give a perceived sense of protection and reduce vulnerability in social encounters. This repetitive usage eventually turns into addiction, which exacerbates the anxiety itself and reinforces avoidance behaviours (Kardefelt-Winther, 2014b).

Based on CIUT, people who are under stress are also likely to get addicted to smartphones since they turn to their devices for solace (Kardefelt-Winther, 2014b). People may

use their smartphones to play games, watch movies, or browse social media as a short-term diversion from personal, social, or academic concerns. Although this offers temporary refuge, using smartphones as a coping strategy frequently results in overuse and a decreased ability to deal with stress in a healthy way (Kardefelt-Winther, 2014a). Consequently, there is a feedback loop between stress and smartphone addiction, as a greater reliance on smartphones might make it harder to properly manage stress (Kardefelt-Winther, 2014a).

CIUT also highlights how smartphones provide a convenient source of engagement and excitement, which helps to explain the connection between boredom proneness and smartphone addiction. Smartphones give those who become bored fast an immediate remedy because of social networking, connection, and an abundant amount of entertainment options (Kardefelt-Winther, 2014a). Long-term smartphone use can become addictive because of this need for continuous interaction. Comparable to the compensating dynamics described by CIUT, the compulsive use of smartphones as a means of escaping boredom occurs when the device is substituted for more productive or meaningful activities (Kardefelt-Winther, 2014b).

Conceptual Framework

With smartphone addiction as the outcome variable, this study examines three predictors: social anxiety, stress, and boredom proneness. Social anxiety, stress, and boredom proneness are hypothesised to be positive predictors of smartphone addiction, as seen in Figure 2.1. According to the current study, among Malaysian university students, social anxiety, stress, and boredom proneness are predictors of smartphone addiction, which are supported by past research (e.g., Malaeb et al., 2022; Zhou & Shen, 2024; Zsido et al., 2021). The Contemporary Internet Use Theory (CIUT), which supports the current study, explains why people resort to the Internet or

digital devices like smartphones to deal with negative feelings or unsatisfied psychological needs.

Firstly, social anxiety is perceived to have a predictive effect on smartphone addiction. Social anxiety, defined as a profound fear of social interactions and possible evaluation, has been significantly associated with problematic smartphone usage (Annoni et al., 2021; Przepiorka et al., 2021). According to CIUT, individuals with social anxiety utilise smartphones as an escape to evade real-life interactions and avoid anxiety-inducing situations (Kardefelt-Winther, 2014b). Individuals with anxiety often experience feelings of powerlessness and helplessness, combined with a fear of social isolation or exclusion from their social circles (Kwak et al., 2022). This may lead them to often utilise a smartphone to maintain social connections with people and mitigate their worries (Wei & Lo, 2006). Elhai et al. (2017b) support this association and find that those exhibiting elevated social anxiety were more prone to demonstrating addicted smartphone behaviours, attributed to their dependence on the device for virtual social interaction and emotional relief. Liu et al. (2023) similarly highlighted that smartphones act as a mitigator of social anxiety, leading to their excessive use among socially anxious individuals. Similarly, Kang et al. (2020) showed that individuals with anxiety were more susceptible to addictive smartphone usage than those without mental health concerns.

Furthermore, stress is hypothesised as a significant predictor of smartphone addiction. Stress, described as a psychological response to unfavourable circumstances (WHO, 2023), is a key predictor of smartphone addiction (Augner & Hacker, 2011). CIUT discusses that individuals under stress frequently pursue distractions or emotional relief via smartphone use, which offers immediate accessibility and diverse coping strategies (Kardefelt-Winther, 2014b). Elamin et al. (2023) revealed that stress correlates positively with excessive smartphone usage,

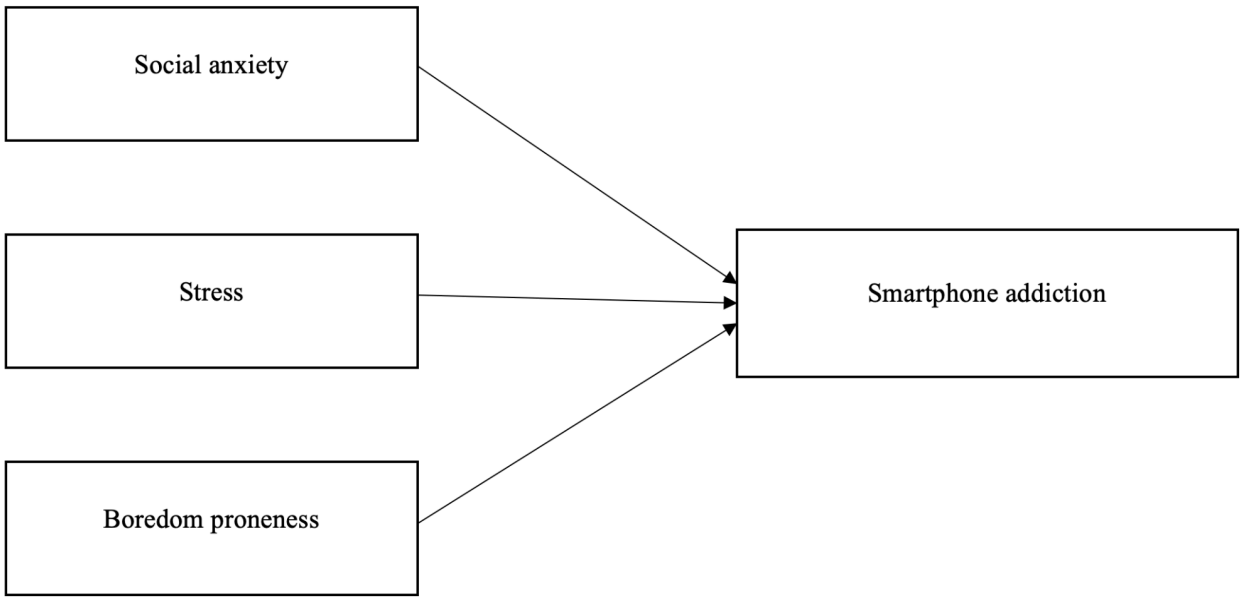
as individuals utilise smartphones to cope with stress-induced unpleasant feelings. Elhai et al. (2017c) discovered that the stress-relieving capabilities of smartphones might unintentionally foster dependency as individuals increasingly depend on them for immediate emotional regulation (Nikolic et al., 2023). According to Nikolic et al. (2023), the utilisation of smartphones functions as a coping strategy for individuals confronting stress.

Moreover, boredom proneness is also expected to have a significant predictive effect on smartphone addiction. Boredom proneness is the tendency to regularly encounter boredom (Zhao et al., 2024), which has been recognised as a variable contributing to smartphone addiction (Camerini et al., 2023). CIUT claims that those who are susceptible to boredom utilise smartphones to reduce their deficit in stimulation and occupy themselves with engaging activities (Kardefelt-Winther, 2014a). Consistently, Zhang et al. (2023) discovered that susceptibility to boredom strongly predicted problematic smartphone usage, as individuals resort to their devices for immediate pleasure and amusement or more gratifying and stimulating activities (Li et al., 2021), hence leading to smartphone addiction. Similarly, individuals with high boredom proneness will exhibit decreased concentration on important tasks and instead participate in enjoyable activities, utilising networked mobile devices to mitigate boredom (Wang et al., 2020). Panova and Lleras (2016) and Wang et al. (2020) also emphasised that smartphones provide multiple activities that momentarily alleviate boredom, hence developing addictive behaviours over time.

Therefore, the current research uses CIUT to explain how social anxiety, stress, and boredom proneness predict smartphone addiction among university students in Malaysia.

Figure 2.1

Conceptual Framework of "The Predictive Roles of Social Anxiety, Stress, and Boredom Proneness on Smartphone Addiction among University Students in Malaysia"



Chapter III

Methodology

Research Design

The research adopted a quantitative, cross-sectional survey design to explore how social anxiety, stress, and boredom proneness predict smartphone addiction among Malaysian university students, as this design was well-suited to the study's assumptions and focus on predictive relationships between variables; therefore, a quantitative method was chosen. Statistical methods and emphasis on collecting numerical data were used in this quantitative research to confirm ideas and identify patterns (Huyler & McGill, 2019; Negou et al., 2023). The research's credibility was increased by using validated scales, which guarantee repeatability and enable findings to be repeated in related studies (Taherdoost, 2016). Furthermore, quantitative approaches helped results be more broadly applicable by gathering information from a sizable, representative sample, which enables the deduction of patterns that go beyond the research participants (Babbie, 2021). .

The study adopted a quantitative approach and gathered data through an online self-administered survey. Standardized psychological scales were utilized to measure key constructs such as smartphone addiction, social anxiety, stress, and boredom proneness. These instruments applied Likert-type response formats, producing interval data that were suitable for statistical analyses, including multiple regression. The cross-sectional survey design, which collects information at a single time point, enabled the study to gather data efficiently while limiting the impact of external factors. This approach was deemed suitable for addressing the study's objectives, specifically testing hypotheses and examining predictive relationships in a data-driven manner (Bryman, 2016; Fowler, 2014). Accordingly, data for this study were

obtained from participants via an online survey administered at a single time point (Wang & Cheng, 2020).

This design was selected due to time and resource constraints, as well as its suitability for examining the associations between psychological variables (Sedgwick, 2014), namely smartphone addiction, social anxiety, stress, and boredom proneness. Collecting data once avoided issues such as respondent attrition while still providing meaningful insights into patterns of behavior and psychological tendencies. Similar to previous studies that have employed cross-sectional designs to investigate the prevalence and correlations of psychological variables (e.g., Kil et al., 2021; Wang & Cheng, 2020), this approach ensured efficiency and relevance to the present research objectives.

Sampling Procedures

Sampling Method

This study utilised a non-probability sampling technique, deemed appropriate as it allowed for the selection of participants in accordance with criteria aligned with the study's objectives. According to Goodwin and Goodwin (2018) and Turner (2020), this method is useful in research where the target group is difficult to reach or not randomly included because of predetermined criteria. In this study, non-probability sampling enhanced the validity and relevance of the data by enabling the recruitment of respondents most representative of the study's focus.

The deliberate selection of participants according to well-defined inclusion criteria was ensured by the use of the purposive sampling method. This method made it particularly convenient to identify participants whose traits aligned with the study's factors of interest. The

inclusion criteria include: (1) Malaysian nationality (2) age 18 and above and (3) present university students who often use smartphones. Purposive sampling made it possible to specifically recruit people who were able to offer insights on the predictive roles of social anxiety, stress, and boredom proneness on smartphone addiction (Berndt, 2020; Campbell et al., 2020).

Snowball sampling was also used to increase the number of participants in order to supplement the purposive sampling technique. According to Naderifar et al. (2017), this strategy entails recruiting participants who then recommend members of their academic or social networks who fit the study's inclusion requirements. Accessing demographics who could be challenging to reach using conventional techniques, including university students who might not actively participate in online survey platforms, was made easier via snowball sampling. Snowball sampling increased the diversity and representativeness of the data acquired by guaranteeing a more complete sample (Kirchherr & Charles, 2018).

Sample Size

The required minimum sample size for this study was determined using the G*Power software (version 3.1.9.7), developed by Faul et al. (2007). Four important factors were taken into account in the calculation: the number of predictors, statistical power, alpha error probability, and effect size (Ko & Lim, 2021).

Three correlation coefficients from previous research on social anxiety, stress, boredom proneness, and smartphone addiction (Sarhan, 2024; Turgeman et al., 2020; Wang et al., 2020) were used to calculate the average effect size (f^2). The correlation coefficients were, respectively, 0.56, 0.328, and 0.287, resulting in an average effect size of 0.2224 (refer to

Appendix B, p.112). According to G*Power calculations, using a 0.95 statistical power and a 0.05 alpha level, the study required a minimum sample of 82 participants (see Appendix C, p. 114). To account for potential missing or incomplete data, a 20% buffer was added (Le et al., 2024), resulting in a target sample size of 98.4≈99 participants.

Participants

Malaysian university students with smartphones and active smartphone users were the targeted participants with an average understanding of the English language. This study recruited bachelor's, master's, and doctoral students across both public and private universities.

Location of Study

The online survey was conducted in Malaysia and was not restricted to any particular state or region. Malaysia is divided into West Malaysia and East Malaysia, comprising a total of 13 states and three federal territories.

Research Instruments

Social Interaction Anxiety Scale-6 Item From (SIAS-6)

Social anxiety was assessed using the Social Interaction Anxiety Scale–6 Item Form (SIAS-6), a shortened version of the original SIAS developed by Fergus et al. (2014), is intended to measure anxiety that is particularly associated with social interactions. Six items on the SIAS-6 will be evaluated on a 5-point Likert scale, with 0 (*not at all characteristic or true of me*) and 4 (*extremely characteristic or true of me*). Sample items include "I have difficulty making eye contact with others," "I feel tense if I am alone with just one person," and "I find it difficult

mixing comfortably with the people I work with." The scale produces a total score from 0 to 24, where elevated scores denote higher social interaction anxiety. The SIAS-6 does not include any reverse-scored items. According to Fergus et al. (2014), the scale demonstrated strong internal consistency, with a Cronbach's alpha value of 0.85. Several studies continued to verify its reliability, ranging from α = 0.742 to 0.92 (Blanc et al., 2014; Ouyang et al., 2020; Song et al., 2024b). Cronbach's alpha was employed to determine the internal reliability of the SIAS-6 in the current study, with α = .842 obtained in the pilot study (see Appendix E, p. 117) and α = .864 in the main study (see Appendix F, p. 118). These results indicate that the scale demonstrated good internal consistency.

Perceived Stress Scale (PSS-10)

Stress was measured using the Perceived Stress Scale (PSS-10) developed by Cohen and Williamson (1988). This widely used instrument evaluates stress by examining individuals' perceptions, feelings, and thoughts experienced over the previous month. This 10-item scale employs a 5-point Likert scale ranging from 0 (*never)* to 4 (*very often*). Sample items include, "In the last month, how often have you felt nervous and stressed?" and "In the last month, how often have you felt that things were going your way?" The total score ranges from 0 to 40, with higher scores reflecting higher perceived stress levels. This scale includes 4 reverse-scored items (Items 4, 5, 7, and 8), such as "In the last month, how often have you felt that things were going your way?" Cronbach's alpha for the PSS-10 has been reported ranging from 0.74 to 0.91 (Jatic et al., 2023; Lee, 2012; Xiao et al., 2023), indicating strong reliability and applicability for diverse populations. The internal consistency of the PSS-10 was determined using Cronbach's alpha for this study, with α = .825 obtained in the pilot study (see Appendix E, p. 117) and α =

.747 in the main study (see Appendix F, p. 118). These results indicate that the scale demonstrated good internal consistency.

Short Boredom Proneness Scale (SBPS)

The Short Boredom Proneness Scale (SBPS), created by Struk et al. (2017), was employed to assess individuals' tendency toward boredom. The SBPS contains 8 items rated on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Sample items include "Many things I have to do are repetitive and monotonous," "I often find myself at "loose ends," not knowing what to do," and "I find it hard to entertain myself." The total score ranges from 1 to 56, with higher scores indicating a greater proneness to boredom. Cronbach's alpha for the SBPS has been reported ranging from 0.81 to 0.88 (Khadra et al., 2025; Martarelli et al., 2022; Struk et al., 2017), highlighting its strong internal consistency and validity. Cronbach's alpha was employed to determine the reliability of the SBPS in the present study, with $\alpha = .904$ obtained in the pilot study (see Appendix E, p. 117) and $\alpha = .869$ in the main study (see Appendix F, p. 118). These results indicate that the scale demonstrated good internal consistency.

Smartphone Addiction Scale-Short Version (SAS-SV)

This study employed the SAS-SV, created by Kwon et al. (2013), to evaluate the level of smartphone addiction. It focuses on problematic usage and its behavioural and psychological impacts. The SAS-SV consists of 10 items, rated on a 6-point Likert scale, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). Sample items include "I have missed planned work due to smartphone use," "I use my smartphone longer than I intended," and "I feel impatient and fretful when I am not holding my smartphone. The total score ranges from 10 to 60, with higher

scores indicating greater levels of smartphone addiction. The SAS-SV does not include reverse-scored items. Kwon et al. (2013) reported a Cronbach's alpha of 0.91, signifying excellent internal consistency, making this scale a reliable measure of smartphone addiction in various populations. The SAS-SV's internal consistency was assessed using Cronbach's alpha in this study, with $\alpha = .881$ obtained in the pilot study (see Appendix E, p. 117) and $\alpha = .897$ in the main study (see Appendix F, p. 118). These results indicate that the scale demonstrated good internal consistency.

Research Procedure

Ethical Clearance Approval

The Scientific and Ethical Review Committee (SERC) at Universiti Tunku Abdul Rahman (UTAR) approved the study ethically prior to the start of data collection (see Appendix D, p. 115). This step was essential given the involvement of human participants, ensuring that the research adhered to ethical standards and that participants' rights were safeguarded. Ethical review is a crucial component of any research project, as it guarantees that the study complies with all regulations, minimizes potential risks, and is conducted in a responsible and acceptable manner.

The target population for this study comprised university students in Malaysia. To ensure appropriate representation, participants were required to meet several inclusion criteria. Specifically, they had to be currently enrolled in a Malaysian university, aged 18 and above, own a smartphone, and possess an average understanding of the English language. These criteria were established to ensure that the study sample was representative and that participants could adequately comprehend and engage with the survey.

Pilot Study

Before conducting the main study, a pilot study was undertaken to assess the feasibility and effectiveness of the questionnaire (Fraser et al., 2018). A default sample size of 30 participants for a pilot study was recommended to ensure sufficient feedback while maintaining efficiency (Perneger et al., 2014).

Participants accessed the online survey through social media channels, including WhatsApp, Instagram, WeChat, Telegram, and Facebook, with a link and QR code provided for ease of participation. Participants were presented with an informed consent form at the start of the survey, which they were required to review before participating. This form clearly outlines the study's objectives, emphasises that participation is voluntary, and assures respondents of the confidentiality of their responses. Participants were then required to provide electronic consent, acknowledging their understanding of the Personal Data Protection Statement, before proceeding with the survey.

The survey itself included four research scales designed to assess key variables relevant to the study. These scales measured social anxiety, stress, boredom proneness, and smartphone addiction. After completing the scales, participants were asked to provide additional demographic information. In the pilot study, participants completed the questionnaire, which was estimated to require approximately 10 to 15 minutes.

This phase was used to identify any issues related to the questionnaire design, participant understanding, and technical aspects of data collection (Hamed, 2021). Conducting this pilot study helped uncover unexpected problems that could arise during the actual study, thus reducing the likelihood of missing or incomplete data (Kang, 2013).

Once the data collection was completed, the responses underwent a thorough screening process to ensure they are complete and eligible for inclusion in the study. The pilot study involved 54 participants in total. After completing the data cleaning process, which entailed the removal of incomplete responses and the exclusion of participants who failed to meet the inclusion criteria, 30 valid cases remained for analysis. Internal consistency for all instruments was assessed through Cronbach's alpha coefficients. The SIAS-6 produced a reliability coefficient of .842, the PSS-10 resulted in .825, the SBPS achieved .904, and the SAS-SV reached .881 (refer to Appendix E, p.117). According to Taber (2017) and Tavakol and Dennick (2011), a Cronbach's alpha value of .70 or higher is generally considered acceptable, values above .80 indicate good reliability, and values exceeding .90 are indicative of excellent reliability. In alignment with these standards, all instruments utilised in the pilot study exhibited good to excellent internal consistency.

Actual Study

The actual study was initiated once the findings from the pilot study were reviewed and confirmed. The survey was conducted over a one-month period, from 1 July 2025 to 5 August 2025. During this time, it was distributed via social media platforms including WhatsApp, Instagram, WeChat, Telegram, and Facebook, allowing participants to access it through either a link or a QR code.

Participants were presented with an informed consent form upon accessing the survey and had to provide electronic consent prior to continuing. The same four research measures as in the pilot study, which are social anxiety, stress, boredom proneness, and smartphone addiction were used, followed by demographic questions (see Appendix A, p.103).

Following data collection, responses were thoroughly screened to ensure completeness, validity, and adherence to inclusion criteria. All incomplete or invalid cases were removed from the dataset to maintain the integrity of the dataset. The finalised dataset was analysed with IBM Statistical Packages for the Social Sciences (version 23), which used statistical procedures such as normality tests, descriptive statistics, and multiple regression analyses, among others.The reliability of the instruments in the current study was evaluated using Cronbach's alpha. All four scales demonstrated satisfactory reliability, indicating their suitability for measuring the intended variables in this sample (refer to Appendix F, p.118). These statistical procedures were employed to assess the relationships among variables and to examine the study's hypotheses.

Data Analysis

Normality Assumptions

The assumption of normality was evaluated using five indicators, namely (1 and 2) skewness and kurtosis. Skewness quantifies the asymmetrical nature of a distribution, while kurtosis assesses the degree of 'peakedness' in that distribution (Bono et al., 2019; Kim, 2013). Values falling within the ±2 range are deemed acceptable for this analysis (Orcan, 2020); (3) the Kolmogorov–Smirnov (K–S) test, which evaluates the extent to which a sample conforms to a specified distribution. Being non-parametric, the test is applicable regardless of the assumed distribution, with *p*-values under .05 reflecting a significant violation of normality (Ghasemi & Zahediasl, 2012; Mishra et al., 2019); (4) a histogram, also referred to as a frequency distribution, which illustrated the data points and offered a visual assessment to evaluate the shape and detect possible outliers. A bell-shaped and symmetric distribution around the mean suggests that the dataset conforms to a normal distribution (Nuzzo, 2019); and (5)

Quantile–Quantile (Q–Q) plots or Probability–Probability (P–P) plots. The purpose of P–P plots is to assess how the cumulative probability of observed data aligns with that of a theoretical distribution (Lozano-Aguilera et al., 2013), while Q–Q plots provide a direct comparison between observed and theoretical quantiles (Velez & Morales, 2015). Previous research has noted that Q–Q plots often present a clearer visual inspection of deviations from normality compared to P–P plots (Dhar et al., 2014; Ghasemi & Zahediasl, 2012; Yue, 2016). For this reason, the present study adopted the Q–Q plot approach.

A Q–Q plot is a scatterplot that compares the quantiles of the observed data with those of a specified theoretical distribution. The plot includes a straight reference line, and when the data points cluster closely around it, this suggests that the data follow an approximately normal distribution (Habibzadeh, 2024).

Multiple Linear Regression (MLR)

This study employed multiple linear regression (MLR) to examine how social anxiety, stress, and boredom proneness predict smartphone addiction. The assumptions underlying MLR were assessed immediately after evaluating normality.

Multivariate Outliers. Outliers are observations that impact the mean and standard deviation and may indicate particular human behaviours or distinct contextual circumstances (Leys et al., 2019). Multivariate outlier into an observation with unusual values across multiple variables, rather than simply an extreme high or low score on a single variable (Leys et al., 2019). Multivariate outliers were assessed using three methods, which are Mahalanobis Distance, Cook's Distance, and Centered Leverage Value. Mahalanobis Distance was utilised to determine outliers based on the sample means and covariance matrix (Yan et al., 2018). According to

Barnett et al. (1979), values below 15 are generally considered acceptable. The influence of each data point on the regression model is evaluated using Cook's Distance, where values below 1 denote an acceptable level of influence. (Camilleri et al., 2024; Cook & Weisberg, 1982). The Centered Leverage Value assesses the extent to which each data point deviates from the mean. According to Hoaglin and Welsch (1978), potential outliers are identified using the formula $(\frac{2(p+1)}{n})$, where p represents the number of predictors and n is the total sample size. In conclusion, data quality and the validity of analyses were safeguarded by identifying potential outliers according to the established cut-off criteria for each method.

Type of variables. Variables are classified into two main categories in this process: discrete (such as ordinal and nominal) and continuous (such as interval and ratio) (Shukla, 2023).

Independent. It refers to the lack of correlation among the predictor variables in a study, enabling the examination of diverse aspects within the research domain (Lim, 2024).

Independence of Residuals. This refers to the lack of correlation between the variables under investigation and the residuals (Schober et al., 2018). This assumption was evaluated using the Durbin–Watson test, with acceptable values falling within the range of 1 to 3 (Champion et al., 1998). Generally, values near to 2 suggest an acceptable degree of independence.

Multicollinearity. It refers to the numerous correlation of predictor variables, as described by Shrestha (2020). This assumption was evaluated using two key indicators, which are tolerance and the variance inflation factor (VIF). According to Vatcheva et al. (2016), correlations among predictors affect the standard errors and variances of the estimated coefficients, with these effects reflected in the VIF values and potentially resulting in non-multicollinearity. According to Miles (2005), tolerance is the inverse of VIF. The VIF is

lower than 10 and the tolerance cut-off range is greater than.10, as suggested by Hair et al. (2010).

Normality of residuals, linearity, and homoscedasticity. The assumptions of normality, linearity, and homoscedasticity were assessed by examining plots of residuals against the predicted values. According to Kim (2019), The random and uniform spread of residuals around the zero line in a scatterplot demonstrates that normality, linearity, and homoscedasticity assumptions are not violated. Specifically, the residuals remained stable across the various combinations of predictor variables, indicating homoscedasticity. This was further assessed using a scatterplot of standardized residuals, where a random dispersion around the horizontal zero line confirmed the assumption of homogeneity of variances (Kim et al., 2024**;** Yang et al., 2019).

Chapter IV

Results

Data Cleaning

Data cleaning, often referred to as data cleansing, is a crucial phase in research to uphold the accuracy and integrity of datasets. It aims to identify and correct errors, address inconsistencies, and handle incomplete information to guarantee high-quality data (Rahm & Hai, 2000). Failure to address missing or incorrect data can introduce ambiguity into the analysis, potentially skewing results and leading to unreliable conclusions (Ridzuan & Zainon, 2019). Consequently, this process improves the reliability of data by fixing inaccuracies and standardizing formats for consistency (Hosseinzadeh et al., 2021). Implementing these procedures in the current study bolstered the overall dataset, ensuring that the outcomes are both valid and representative.

This research has a total of 157 responses. During data cleaning, 44 cases were excluded due to incomplete survey progress, lack of informed consent, or failure to meet the inclusion criteria, such as indicating an educational level beyond the specified range (e.g., foundation level) or being a non-Malaysian. After these removals, 113 valid responses remained for analysis. In addition, response patterns such as straight-lining were checked to ensure data quality. The dataset was then exported from Qualtrics into SPSS, where manual cross-checking was conducted to verify consistency.

Normality Assumptions

The assumptions of normality are assessed using five indicators that include histograms, Quantile-Quantile plot (Q-Q plot), skewness and kurtosis values, and Kolmogorov-Smirnov (K-S) test.

Histogram

The histograms for all continuous variables demonstrated a bell-shaped curve, suggesting that the data was relatively close to the mean value. As a result, this indicator for each variable fulfilled the assumptions of normalcy (Appendix G, p.119).

Q-Q Plot

The normality was verified further using the Q-Q plot. The Q-Q plots for each variable revealed equally dispersed spots along a diagonal line, supporting the assumption of normality (Appendix H, p.121).

Skewness and Kurtosis Values

The skewness and kurtosis values for the variables were generally within the acceptable range of ±2. As shown in Table 4.1, skewness values ranged from –.338 to .667, and kurtosis values ranged from –.799 to 2.125. These results indicate that the normality assumption was adequately met for all variables, except for stress, which exhibited a slight violation in kurtosis. However, based on (Hatem et al., 2022), the threshold for kurtosis value can be ±3 which allows the value of stress to be significant.

Table 4.1

Skewness and Kurtosis Value for Each Variables

Variables	Skewness	Kurtosis
Smartphone Addiction	-.283	-.414
Social Anxiety	.450	-.217
Stress	.667	2.125
Boredom Proneness	-.338	-.799

Kolmogorov-Smirnov (K-S) Test

The K–S test yielded a non-significant result ($p > .05$), suggesting that the data do not significantly deviate from a normal distribution (Kwak, 2023). Table 4.2 shows that the test values for smartphone addiction D (113) = .199, $p > .05$, social anxiety D (113) = .060, $p > .05$, and stress D (113) = .200, $p > .05$ were normally distributed. while boredom proneness, D (113) = .021, $p < .05$, shown non-normally distributed in this indicator (refer to Appendix I, p.123).

Table 4.2

Kolmogorov-Smirnov Test

Variables	Significant value
Smartphone Addiction	.199
Social Anxiety	.060
Stress	.200*
Boredom Proneness	.021

*. This is a lower bound of the true significance

Summary of Normality Assumptions

The histograms, Q–Q plots, skewness, and kurtosis values for all variables were examined and indicated good normality assumptions. However, the K-S test for boredom proneness did not meet the acceptable criterion (Ghasemi & Zahediasl, 2012). All variables were

deemed to satisfy the assumptions of normality, with stress and boredom proneness meeting three out of five normality indicators, while smartphone addiction and social anxiety met all five indicators, showing no violations.

Outliers

Multivariate outliers

The current study utilised Mahalanobis Distance, Cook's Distance, and Centred Leverage range with a standard deviation of two to analyse multivariate outliers. Table 4.3 shows three potential outliers that are cases 14, 58, and 105. According to Mahalanobis Distance, the assumption was not violated because no cases exceeded the threshold of 15 (Barnett et al. 1979). Furthermore, all examples in Cook's Distance are less than one (Cook & Weisberg, 1982). Furthermore, the determined Centred Leverage value of the current study 0.0708 was obtained using the formula ($\frac{2(p+1)}{n}$). Hoaglin and Welsh (1978) identified that cases with a greater value than Centred Leverage are most likely multivariate outliers. However, none of the cases were eliminated since they did not exceed the residual statistics threshold. None of the examples had a substantial influence on the model's parameters, thus they were all included in the data analysis (refer to Appendix J, p.123).

Table 4.3

Multivariate Outliers Test

Variables	Case ID	Mahalanobis Distance	Cook's Distance	Centered Leverage Value
Group_1	14	3.30761	.05201	.02953
	58	5.77001	.28389	.05152
	105	.59391	.00006	.00530
Total N	3	3	3	3

Descriptive Statistics

The current study consisted of 113 university students, that shows 38.1% were males (*n* = 43) and 61.9% were females (*n* = 70). Majority of the participants were Chinese (57.5%, *n* = 65) whereas 25.7% of Malays (*n* = 29), 15.0% of Indians (*n* = 17) and others (1.8%, *n* = 2) in this study. The participants' ages ranged between 18 and 32 years, with a mean of 22.26 (*SD* = 1.66). Most students were from Universiti Tunku Abdul Rahman (*n* = 49), while the rest represented various other Malaysian universities. All the participants of the study own and actively use a smartphone. Based on the data showed, the frequency of smartphone use per day from 1 to 3 hours shows the least which is 8.0% (*n* = 9), following with 10 to 12 hours being 15.0% (*n* = 17), 4 to 6 hours at 25.7% (*n* = 29), and the highest being 7 to 9 hours which shows 51.3% (*n* = 58).

Table 4.4

Frequency Distribution of Participants Demographic Variables and Main Variables

	n	*%*	*M*	*SD*
Age			22.26	1.66
Gender				
Male	43	38.1		
Female	70	61.9		
Race				
Malay	29	25,7		
Chinese	65	57.5		
Indian	17	15.0		
Others	2	1.8		
Nationality				
Malaysian	113	100		
Current Education Level				
Bachelor's degree	110	97.3		
Master's Degree	2	1.8		
Others	1	.9		

Table 4.4 (Continued)

Frequency Distribution of Participants Demographic Variables and Main Variables

	n	*%*	*M*	*SD*
Institution				
IKBN Tanah Merah	1	.9		
International Medical University	1	.9		
Inti International University	1	.9		
IPG Kampus Dato' Razali Ismail	1	.9		
IPGM Kampus Ipoh	1	.9		
Management and Science University	1	.9		
Methodist College Kuala Lumpur	1	.9		
MMU Cyberjaya	3	2.7		
Multimedia University	2	1.8		
Politeknik Balik Pulau	1	.9		
Quest International University	11	9.7		
Sunway College Ipoh	1	.9		
Sunway University	2	1.8		
Tunku Abdul Rahman University of Management and Technology	8	7.1		
UCSI University	1	.9		
UNITAR University	1	.9		
Universiti Kuala Lumpur	1	.9		
Universiti Malaya	2	1.8		
Universiti Malaysia Kelantan	3	2.7		
Universiti Malaysia Sarawak	3	2.7		
Universiti Malaysia Terengganu	2	1.8		
Universiti Pendidikan Sultan Idris	1	.9		
Universiti Putra Malaysia	1	.9		
Universiti Sains Malaysia	2	1.8		
Universiti Teknikal Malaysia Melaka	1	.9		
Universiti Teknologi Malaysia	4	3.5		
Universiti Teknologi MARA	6	5.3		
Universiti Tunku Abdul Rahman	49	43.4		
YTL International College	1	.9		
Smartphone Ownership	113	100		

Table 4.4 (Continued)

Frequency Distribution of Participants Demographic Variables and Main Variables

	n	*%*	*M*	*SD*
Frequency of Smartphone Usage Per Day (Hours)				
1 – 3	9	8.0		
4 – 6	29	25.7		
7 – 9	58	51.3		
10 – 12	17	15.0		

Multiple Linear Regression (MLR) Assumptions

Type of Variables

All study variables are continuous, satisfying the assumptions required for multiple linear regression. Therefore, the assumption was satisfied, with no violations.

Multicollinearity

The correlation of each independent variable was analysed using tolerance and variance inflation factor (VIF). The tolerance and VIF cut-off points are indicated to be above .10 and below 10 correspondingly (Shrestha, 2020). As shown in Table 4.5, the tolerance and VIF values for all independent variables suggest that there are no multicollinearity violations (refer to Appendix K, p.126).

Table 4.5

Collinearity Statistics

	Tolerance	VIF
Social Anxiety	.608	1.644
Stress	.840	1.190
Boredom Proneness	.592	1.691

Independence of Residuals

Residual independence was examined using the Durbin–Watson test, with benchmark values considered acceptable between 1 and 3 (Champion et al., 1998). As shown in Table 4.6, the Durbin–Watson value of 2.109 indicates that the assumption is satisfactorily met, being close to the ideal value of 2 (refer to Appendix K, p.126).

Table 4.6

Independent Error Test

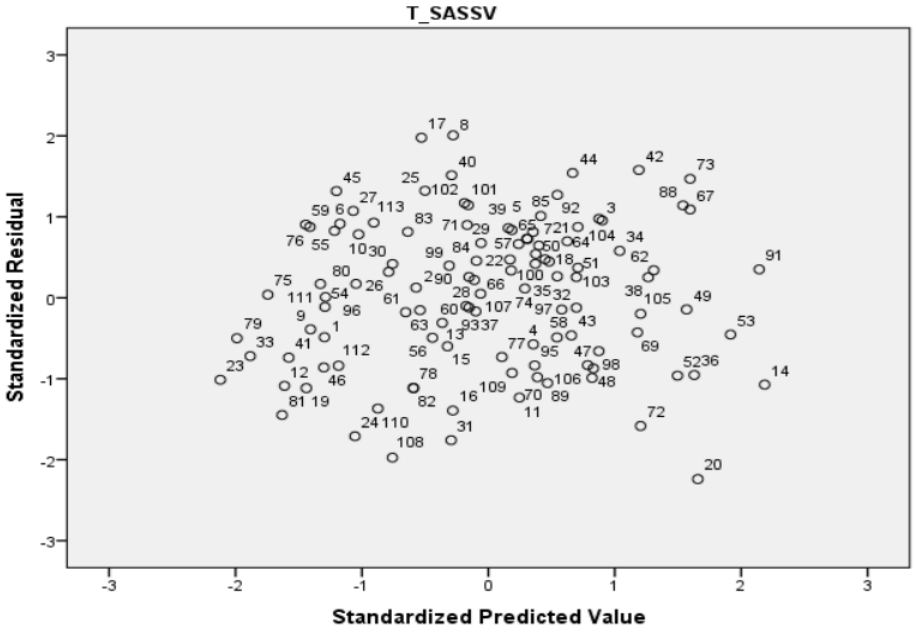
Model	Durbin-Watson
1	2.109

Normality of Residuals, Linearity, and Homoscedasticity

The scatterplot in Figure 4.1 demonstrates that residuals cluster around zero and are distributed in a random pattern. All three assumptions of multiple linear regression analysis were fulfilled.

Figure 4.1

Scatterplot



Multiple Linear Regression (MLR) Analysis

In the present study, multiple regression analysis was conducted to examine the predictive roles of social anxiety, stress, and boredom proneness on smartphone addiction (refer to Appendix K, p.126). Based on Table 4.7, it shows statistical significance in the model as F (3,112) = 29.669, $p < .000$, and accounted for 43.4% of variances. Table 4.7 showed social anxiety ($\beta = .390$, $p < .000$) and boredom proneness ($\beta = .306$, $p = .001$) significantly and positively predicts smartphone addiction while stress ($\beta = .096$, $p = .217$) is not a reliable indicator for university students in Malaysia. Table 4.8 revealed that social anxiety and boredom proneness are significant predictors of smartphone addiction. Therefore, it can be concluded that only H_1 and H_3 of the study are supported.

Table 4.7

Result of Regression Model

	df	*F*	*p*	*Adj.* R^2
Regression	3	29.669	.000	.434
Residual	109			
Total	112			

Note. Dependent Variable = Smartphone addiction. Predictors = Social anxiety, perceived stress, and boredom proneness.

Table 4.8

Result of Regression Coefficient

	Std. β	*t*	*p*
Social anxiety	.390	4.284	.000
Perceived stress	.096	1.242	.217
Boredom proneness	.306	3.308	.001

Note. Dependent Variable = Smartphone addiction.

Summary of Findings

As shown in Table 4.9, the study findings supported H_1 and H_3, while H_2 was not supported.

Table 4.9

Summary of Findings

Hypotheses	Std. β	p	Decision
H_1: Social anxiety positively predicts smartphone addiction among university students in Malaysia.	.390	.000	Supported
H_2: Stress positively predicts smartphone addiction among university students in Malaysia.	.096	.217	Not Supported
H_3: Boredom proneness positively predicts smartphone addiction among university students in Malaysia.	.306	.001	Supported

Chapter V

Discussion

H_1: Social anxiety positively predicts smartphone addiction among university students in Malaysia.

The study's results supported the first hypothesis, indicating that social anxiety positively predicts smartphone addiction among university students in Malaysia. This suggests that social anxiety functions as a significant predictor of smartphone addiction. This result aligns with previous research (Fatima et al., 2025; Kadavala et al., 2021; Lim et al., 2023; Ran et al., 2022; Sahimi et al., 2022; Thatkar et al., 2021; Turgeman et al., 2020; Wang et al., 2025; Zhou & Feng, 2025), which has consistently demonstrated that individuals with social anxiety are more likely to use their smartphones excessively, which can eventually result in smartphone addiction.

Fatima et al. (2025) noted that smartphone use can intensify social anxiety, underscoring the importance of strategies that encourage healthier digital practices among students. Similarly, Wang et al. (2025) noted that socially anxious individuals frequently resort to smartphones and the internet to escape real-world social interactions, preferring online communication as a safer alternative to face-to-face communication. Through social media platforms, students with social anxiety may seek acceptance and validation, which can reinforce excessive smartphone use and possible addiction (Wang et al., 2025). In line with this view, Zhou and Feng (2025) found that socially anxious individuals tend to exhibit increased self-consciousness, expect unfavorable social outcomes, and tend to focus more on negative social cues during face-to-face interactions. Consequently, avoidance of offline interactions could lead to compensatory smartphone use to address unmet social needs (Lei & Russell, 2020).

Beyond social features, socially anxious individuals may prefer to engage in non-social smartphone activities. Sahimi et al. (2022) observed that these individuals often engage in activities like news consumption, entertainment, and relaxation as strategies to alleviate shame and discomfort associated with face-to-face interaction. Turgeman et al. (2020) similarly argued that socially anxious individuals prefer low-risk engagements, with online interactions providing a platform to conceal or manage less favorable traits (Huan et al., 2014). For instance, Weidman et al. (2012) found that socially anxious students in the United States were more at ease and more willing to share personal information in online environments than in face-to-face interactions. While this form of online communication can promote self-expression, excessive reliance on smartphones may eventually exacerbate social withdrawal (Turgeman et al., 2020).

Interestingly, some studies highlight potential benefits of online communication. Campbell et al. (2006) suggested that online chatting may serve as a platform for socially anxious individuals to practice and improve their social skills. Ran et al. (2022) highlighted that social anxiety serves as a major risk factor contributing to the onset of smartphone addiction.

Moreover, individuals with elevated social anxiety often struggle with regulating their emotions (Farmer & Kashdan, 2012), which may lead them to use smartphones as external tools for emotional regulation. This encompasses both social features (e.g., messaging, social media) and non-social applications (e.g., gaming, video streaming), which provide temporary relief but ultimately increase the risk of overdependence (Liu & Baharudin, 2025). Within the framework of newer models of social communication, Yoon et al. (2006) proposed that socially anxious students may avoid face-to-face interactions to minimize cognitive distortions linked to negative feedback, opting instead for smartphones as alternatives to real-life engagement. Ultimately, individuals experiencing elevated levels of social anxiety are more susceptible to developing

dependence on smartphones and related forms of internet addiction (Liu & Baharudin, 2025), thereby reinforcing the significant predictive role identified in this study.

H_2: Stress positively predicts smartphone addiction among university students in Malaysia.

The second hypothesis suggested that stress would positively predict smartphone addiction among Malaysian university students. Contrary to this expectation, the findings revealed that stress did not significantly predict smartphone addiction. This outcome contrasts with previous studies that identified a significant positive link between stress and smartphone addiction (Elhai et al., 2017; Samaha & Hawi, 2016; Samat et al., 2022; Wang et al., 2015; Wang et al., 2021). These prior research suggests that individuals under high stress often resort to smartphone use as a coping mechanism, whether to relieve tension, escape from distress, or obtain social support.

The discrepancy between the current results and past findings may be attributed to several contextual factors. One possible explanation is that Malaysian university students may employ alternative coping mechanisms to manage stress (Al-Dubai et al., 2011; Mustafa et al., 2023; Yusoff et al., 2011), such as seeking familial or peer support (Khan & Namita, 2025), engaging in religious or spiritual practices (Zakaria et al., 2021), or participating in recreational activities (Lepp et al., 2013) that do not involve excessive smartphone use (Koçak et al., 2025). These culturally specific coping strategies could reduce reliance on smartphones as a stress-relief tool (Moqbel et al., 2024).

Another explanation could relate to the differential impact of specific stressors. While prior studies often emphasized academic stress (Barbayannis et al., 2022; Pascoe et al., 2019) or daily hassles, such as health-related and social stressors (Kamarudin et al., 2009), students in this

study may have perceived stress in a broader sense, with not all forms of stress necessarily driving them toward excessive smartphone use. For instance, some stressors may motivate adaptive behaviors, such as stronger school engagement or healthier coping mechanisms (Hao et al., 2023); or more constructive behaviours, such as increased studying or physical activity (Spiratos & Ratanasiripong, 2023), rather than maladaptive reliance on smartphones. Furthermore, the rapid normalization of smartphone use in daily life may mean that stress is no longer a predictor of smartphone addiction, no matter the type of smartphone uses, such as online or offline (Tu et al., 2023), as students use smartphones regularly regardless of stress levels (Wang et al., 2025).

Cultural and cultural variables might possibly explain these findings. In Malaysia, stress is frequently associated with academic expectations and financial constraints (Toh et al., 2022; Sahimi et al., 2022). However, rather than resorting to smartphones, university students may rely on familial support or peer networks to deal with these pressures, which is consistent with Malaysian culture's collectivism. As a result, smartphone use may be more strongly related with boredom or a need for social connection than with stress management itself.

In addition, the concept of technostress, in which people feel overwhelmed by their reliance on technology (Yusuf et al., 2024), may offer more understanding. Instead of relieving stress, smartphone addiction can sometimes exacerbate anxiety and dissatisfaction (Córdova et al., 2023; Tu et al., 2023). It is conceivable that in this study, students experiencing high stress were more aware of the negative implications of smartphone addiction, discouraging rather than encouraging addictive behaviours.

Although earlier studies have demonstrated a connection between stress and smartphone addiction, the present study provides limited empirical support for this relationship within the

Malaysian university context. The findings suggest that stress, in isolation, may not adequately predict smartphone addiction, and that broader psychological, cultural, and environmental influences could exert a more substantial impact. Future studies should examine potential mediating or moderating factors, such as boredom proneness, social anxiety, and self-regulation (Wang et al., 2020), which may explain the complex pathways linking stress and smartphone addiction.

H_3: Boredom proneness positively predicts smartphone addiction among university students in Malaysia.

The study's results confirmed the third hypothesis, indicating that boredom proneness positively predicts smartphone addiction among Malaysian university students. This outcome aligns with earlier studies suggesting that individuals who frequently experience boredom tend to engage in habitual smartphone use as a way to alleviate dissatisfaction and restlessness (Kim et al., 2016; Vodanovich, 2003). Smartphones, with their continual availability of entertainment and interactive information, provide a readily accessible outlet for students who are unable to endure boredom, promoting recurrent usage patterns that might lead to addictive behaviour (Munusamy & Ghazali, 2022).

Boredom proneness may be predicted using the psychological processes of rapid reward and avoidance of distress. Individuals that are easily bored have a limited tolerance for unstructured or boring tasks, leading them to seek quick stimulation (Bench & Lench, 2019). Smartphones, through social media, gaming, and streaming services, provide immediate and constant rewards that meet this demand, resulting in a loop of compulsive usage (Camerini et al., 2023). In the case of Malaysian students, this cycle is exacerbated by the cultural and

environmental setting, in which smartphones are widely available and incorporated into daily life.

Furthermore, boredom is directly related to low self-discipline, making it difficult for people to restrict their smartphone use even when it interferes with educational responsibilities or social connections (Leung, 2020). This lack of self-regulation exacerbates usage, perpetuating a cycle of reliance that is consistent with addictive behaviour. For example, research has revealed that students with greater degrees of boredom proneness frequently participate in "mindless scrolling" on social media, spending excessive time online with no specified goals (Leung, 2020; Seo & Ray, 2019). Such activities suggest a maladaptive coping mechanism in which smartphones are used to fill in time gaps and avoid boredom, eventually leading to problematic use.

University students in Malaysia are especially prone to this route because of the abundance of internet access and a lack of leisure options on campus. Goh et al. (2018) discovered that Malaysian students commonly use smartphones to pass the time while bored, including popular activities such as gaming, surfing, and streaming. This is consistent with Li et al. (2023) argument that cultural and environmental variables, such as unstructured scheduling, exacerbate the link between boredom proneness and smartphone addiction. Consequently, boredom not only drives students to increase their smartphone use but also consistently emerges as a predictor of addictive behaviours among Malaysian university students.

Overall, the findings of this study add to the expanding evidence that boredom proneness serves as a significant predictor of smartphone addiction among Malaysia university students. In line with prior studies, the findings underscore the importance of boredom management and

self-regulation strategies as potential interventions to mitigate smartphone addiction among university students (Alotaibi et al., 2022; Arumugam et al., 2020).

Implication

Theoretical Implication

In this study, the CIUT was utilized to examine how social anxiety, stress, and boredom proneness predict smartphone addiction among Malaysian university students. The CIUT suggests that individuals turn to digital devices like smartphones to cope with negative emotions or unmet psychological needs, which may provide short-term relief but also increase the likelihood of overdependence and addiction (Kardefelt-Winther, 2014a; Kardefelt-Winther, 2014b). The findings of this study both reinforce and, to some extent, challenge the CIUT framework, providing more nuanced perspectives on its relevance and applicability. Specifically, the findings revealed that social anxiety (H_1) and boredom proneness (H_3) positively and significantly predicted smartphone addiction among Malaysia university students, whereas stress (H_2) did not significantly predict smartphone addiction. The significant predictive roles of social anxiety and boredom proneness suggest that CIUT serves as a valuable framework for explaining how university students rely on smartphones to cope with adverse emotional states, including feelings of social anxiety and boredom. These findings align with previous studies on social anxiety, reinforcing its role as a significant predictor of smartphone addiction (Fatima et al., 2025; Kadavala et al., 2021; Lim et al., 2023; Ran et al., 2022; Sahimi et al., 2022; Thatkar et al., 2021; Turgeman et al., 2020; Wang et al., 2025; Zhou & Feng, 2025) and boredom proneness (Alotaibi et al., 2022; Arumugam et al., 2020; Bench & Lench, 2019; Camerini et al., 2023; Goh

et al. 2018; Leung, 2020; Li et al., 2023; Seo & Ray, 2019), thereby reinforcing the applicability of CIUT in the Malaysian context.

Firstly, the finding that social anxiety positively predicts smartphone addiction (H_1) provides strong empirical support for CIUT. Students experiencing heightened social anxiety appear to use smartphones as a form of avoidance-based coping, substituting uncomfortable face-to-face interactions with safer and more controlled online communication. This finding reinforces the theoretical notion that individuals with social anxiety tend to over-rely on smartphones, as these devices help minimize perceived social risks while providing a sense of connection without the immediate pressures of face-to-face interaction (Kardefelt-Winther, 2014b). The study confirms CIUT's prediction that compensatory smartphone use becomes particularly pronounced when offline coping resources are limited.

Similarly, the finding that boredom proneness predicts smartphone addiction (H_3) also aligns with CIUT. According to the theory, individuals who frequently experience under-stimulation or lack of engagement may compensate by seeking stimulation through their smartphones. Consistent with this, students high in boredom proneness appeared to rely on smartphones' entertainment and social networking functions to escape monotony and achieve instant gratification. This supports the compensatory dynamic described by CIUT, wherein digital engagement becomes a substitute for more meaningful offline activities, ultimately heightening the risk of addiction (Kardefelt-Winther, 2014a). Thus, the results affirm the theoretical relevance of CIUT in explaining how boredom-related deficits in arousal or engagement contribute to maladaptive technology use, which leads to smartphone addiction.

In contrast, the hypothesis that stress predicts smartphone addiction (H_2) was not supported. This result contrasts with prior research, which identified stress as a significant

positive predictor of smartphone addiction (Amin et al., 2024; Samaha & Hawi, 2016; Samat et al., 2022; Vujić & Szabo, 2022; Wang et al., 2015; Wang et al., 2021). This outcome partially challenges CIUT, which suggests that individuals experiencing stress should turn to smartphones as a coping tool for emotional relief. The nonsignificant result implies that stress may not independently drive smartphone addiction when examined alongside other variables such as social anxiety and boredom proneness. Students may employ alternative coping strategies for stress regulation, such as seeking familial or peer support (Khan & Namita, 2025), engaging in religious or cultural practices (Zakaria et al., 2021), or relying on offline mechanisms (Thembane, 2024). Another possibility is that stress overlaps with anxiety-related mechanisms (Shin & Park, 2025), thereby diminishing its unique predictive power when modeled together with social anxiety (Blöte et al., 2021).

This inconsistency suggests that the role of stress in the compensatory process may be more complex and potentially influenced by contextual or cultural factors. Consequently, the current study highlights a possible limitation of CIUT, as it may not fully capture the mechanisms through which stress relates to excessive smartphone use among Malaysian university students. This gap highlights opportunities for future research to investigate alternative explanations, potential mediating factors, or cultural influences that may help clarify the link between stress and smartphone addiction.

Practical Implication

The findings of this study provide valuable insights into the factors that contribute to smartphone addiction among Malaysia university students. The study revealed that social anxiety (H_1) and boredom proneness (H_3) are significant predictors of smartphone addiction, although

stress (H_2) is not. These findings can be meaningfully interpreted through the lens of CIUT, which suggests that individuals turn to digital technologies as a way of coping with negative emotions and unmet psychological needs (Kardefelt-Winther, 2014a).

Firstly, the findings underscore the need of university-based activities to minimise students' reliance on smartphones to manage social anxiety. Universities should organise more interactive seminars, peer-support groups, and public-speaking events to assist students gain confidence in real-world situations. Promoting face-to-face social activities, including cultural events, sports, and collaborative projects, may help reduce students' inclination to seek comfort primarily in online spaces. Mental health services on campus should screen and advise socially anxious students, as well as give coping skills that promote healthier social involvement rather than smartphone reliance.

Secondly, considering boredom was the largest predictor, universities and politicians should develop engagement-focused policies that provide students with enjoyable alternatives to smartphone use. For example, universities might increase extracurricular options by encouraging student organisations, volunteering programs, and skill-building courses that allow students to spend their leisure time in productive ways. Study spaces, libraries, and cafeterias might also create "phone-free zones" or post encouraging reminders like "Look up and connect" to encourage students to interact with their friends. These modifications may precipitate a societal shift in which face-to-face interaction takes priority over digital distraction.

The findings show that mental health providers should carefully consider boredom and social anxiety when dealing with excessive smartphone use. For instance, counsellors can use behavioural tactics to assist students manage boredom more successfully such as, goal setting and activity scheduling and progressively diminish their dependency on smartphones for

stimulation. Furthermore, personalised awareness programs on the potential risks of smartphone addiction can help students recognise when they are compensating for bad emotions through hazardous digital habits.

From a policy perspective, public awareness campaigns and digital well-being programs should highlight the consequences of smartphone addiction, which is connected to boredom and social anxiety. Universities and governments may work together to develop standards that encourage healthy smartphone behaviours, such as taking planned breaks from gadgets during lectures or social gatherings. These regulations can also be applied to public settings, promoting more responsible use of technology in everyday life.

In summary, the findings indicate that minimising smartphone addiction among students necessitates practical measures centred on controlling boredom and social anxiety rather than stress. Educators, mental health professionals, researchers, policymakers, and the public can work together to combat smartphone addiction and promote healthier digital habits among Malaysian university students by implementing structured engagement opportunities, promoting phone-free environments, and raising public awareness.

Limitation of Study

This study is not without limitations, which should be taken into account when interpreting the results. First, this study employed a cross-sectional survey design. Although this approach is effective for collecting data at a single point in time, it restricts the ability to draw causal inferences regarding the relationships between variables (Maier et al., 2023) to be drawn between the predictors (social anxiety, stress, and boredom proneness) and smartphone addiction. Although the regression analyses showed that social anxiety and boredom proneness

significantly predicted smartphone addiction, the findings are limited to statistical associations measured at one point in time.

Secondly, the sampling method presents limitations to the generalizability of the findings. A combination of purposive and snowball sampling was utilized, which may have introduced selection bias by recruiting participants who share similar networks or backgrounds (Ting et al., 2025). Moreover, the sample was not demographically balanced, as the majority of participants were Chinese (57.5%) and nearly half were from a single institution, Universiti Tunku Abdul Rahman (43.4%). This overrepresentation narrows the range of perspectives captured and constrains the generalizability of the findings to the broader population of Malaysian university students. Additionally, the relatively modest sample size (n = 113) further reduces external validity, as small samples may not adequately capture the heterogeneity of experiences across universities and ethnic groups in Malaysia. Considering the country's varied cultural, ethnic, and socioeconomic framework, a more extensive and diverse sample would have been required to accurately represent the population. In addition, limited samples increase the likelihood of sampling bias.

Thirdly, the study relied exclusively on self-report measures to assess social anxiety, stress, boredom proneness, and smartphone addiction. While validated instruments were employed, self-reporting is inherently susceptible to biases such as social desirability, underreporting, or inaccurate self-perceptions (Latkin et al., 2017). These biases may have led participants to provide responses that do not fully reflect their actual psychological states or smartphone use behaviours. Furthermore, the instruments were adapted from research primarily conducted in Western contexts, which may not fully account for cultural variations in how stress, anxiety, or boredom are expressed and understood. As Hofmann et al. (2010) highlighted, an

individual's social concerns must be analyzed considering their cultural, racial, and ethnic heritage. This suggests that the non-significant role of stress in predicting smartphone addiction could partly be attributed to cultural differences in the way Malaysian university students perceive and report stress compared to populations in prior studies.

Finally, the model employed in this study focused exclusively on three psychological predictors, including social anxiety, stress, and boredom proneness. Collectively, these predictors accounted for 43.4% of the variance in smartphone addiction. Although this highlights their significance, it also suggests that 56.6% of the variance is attributable to other unexamined factors. This restricts the scope of the findings and implies that smartphone addiction may be influenced by additional factors beyond those investigated in this study.

Recommendation of Study

Based on the limitations found, numerous suggestions may be made to guide future research on the determinants of smartphone addiction among Malaysian university students. The current study utilised a cross-sectional approach, future studies should use longitudinal or experimental designs to further demonstrate causal links between psychological variables and smartphone addiction. A longitudinal approach would allow researchers to examine changes in smartphone usage habits over time, providing more evidence of whether characteristics like social anxiety and boredom proneness directly contribute to the onset of smartphone addiction (Maier et al., 2023). Experimental treatments, such as digital detox programs or coping-skills training, might potentially be implemented to see whether psychological changes influence smartphone addiction.

Secondly, to minimise sampling bias and improve generalisability, future studies should employ a larger and more demographically varied sample, ensuring more balanced representation across different racial groups to provide equal opportunities for participation. Although the present study did not aim to examine racial differences in smartphone addiction, the data and representation of other racial groups were comparatively limited relative to Chinese students and those from Universiti Tunku Abdul Rahman. However, using probability sampling or stratified random sampling among several Malaysian institutions would help to assure representation across gender, ethnicity, socioeconomic status, and academic background. A larger balanced sample will not only increase the findings' external validity, but would also give a more in-depth knowledge of how smartphone addiction develops in diverse subgroups of Malaysian students (Memon et al., 2020).

Thirdly, given the emphasis on self-report measures, future research should investigate using several methods to improve validity. For example, smartphone usage data may be obtained directly from device monitoring programs, providing objective estimates of screen time and application activity. Furthermore, qualitative studies like interviews or focus groups can provide deeper cultural and contextual insights on how students cope with anxiety,

Fourthly, to overcome the limitations of cultural influences, future research should design and evaluate measuring tools tailored to the Malaysian setting. This might include performing experimental studies to assess cultural relevance or creating indigenous scales that represent local perceptions of social anxiety, stress, and boredom proneness. Hofmann et al. (2010) claimed that psychological dimensions must be addressed within cultural contexts; hence, culturally sensitive methods may help explain why stress did not emerge as a major predictor in this study.

Finally, although the current model explained 43.4% of the variation in smartphone addiction, future research should widen the predictions to include other psychological, social, and environmental factors. Personality attributes such as, neuroticism, and impulsivity, familial environment, peer influence, and technical elements like, app design, and alerts may all play important roles (Bai et al., 2024). Incorporating these characteristics into prediction models might result in a more complete knowledge of smartphone addiction among university students.

In summary, future research should use more robust designs, varied samples, multi-method data collecting, quantify cultural adaptability, and broaden the range of factors studied. These enhancements would increase the validity, generalisability, and explanatory power of research into smartphone addiction in Malaysia.

Conclusion

In summary, this study examined the predictive roles of social anxiety, stress, and boredom proneness on smartphone addiction among Malaysian university students, using CIUT as the guiding framework. The results showed that social anxiety and boredom proneness were significant predictors of smartphone addiction, whereas stress was not. These results indicate that students experiencing higher levels of social anxiety and boredom are more likely to depend on their smartphones, whereas stress may not directly influence addictive use.

Specifically, the significant role of social anxiety suggests that students often turn to smartphones as a safer alternative to face-to-face interactions, which may provide temporary comfort but increase the risk of dependency. Likewise, boredom proneness was a strong predictor, showing that students are inclined to use smartphones for entertainment and stimulation when disengaged, reinforcing problematic usage patterns. In contrast, stress was not

a significant predictor, which may reflect the use of alternative coping strategies among Malaysian students, such as peer support, family connections, or cultural practices, instead of reliance on digital devices.

Theoretically, these findings extend the applicability of CIUT by supporting its assumptions in relation to social anxiety and boredom, while also challenging its universality with regard to stress. The findings highlight that practical strategies addressing social anxiety and boredom proneness could play a vital role in preventing and reducing smartphone addiction among university students.

Taken together, the study offers valuable insights into the psychological factors that contribute to smartphone addiction among Malaysian university students. By identifying social anxiety and boredom proneness as key predictors, the research provides valuable direction for mental health interventions, university-based initiatives, and digital well-being programs. Future studies are encouraged to extend these findings by adopting longitudinal research designs, incorporating more diverse samples, and utilizing culturally sensitive measures to provide a more holistic understanding of smartphone addiction.

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Appendices

Appendix A

Questionnaire

Wholly owned by UTAR Education Foundation
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DU012(A)

Department of Psychology and Counseling
Faculty of Arts and Social Science
Universiti Tunku Abdul Rahman

Introduction

We are third-year psychology students from UTAR and are currently conducting a final year project (FYP). Our FYP examines the predictive effects of social anxiety, stress, boredom proneness on smartphone addiction among university students in Malaysia. We would like to invite you to participate in this project by answering a few questions.

Procedures and Confidentiality

The following questionnaire will require approximately 10-15 minutes to complete. All information provided will remain as **private and confidential**. The information given will only be reported as group data with no identifying information and only use for academic purpose.

Participation

All the information gathered will remain anonymous and confidential. Your information will not be disclosed to any unauthorized person and would be accessible only by group members. Participant in this study is voluntary, you are free to withdraw with consent and discontinue participation in anytime without prejudice. Your responses will be coded numerically in the research assignment for the research interpretation. Your cooperation would be greatly appreciated.

If you choose to participate in this project, please answer all the questions as honestly as possible and return the completed questionnaire promptly.

→

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DU012(A)

PERSONAL DATA PROTECTION NOTICE

Please be informed that in accordance with Personal Data Protection Act 2010 ("PDPA") which came into force on 15 November 2013, Universiti Tunku Abdul Rahman ("UTAR") is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

1. Personal data refers to any information which may directly or indirectly identify a person which could include sensitive personal data and expression of opinion. Among others it includes:

a) Name
b) Identity card
c) Place of Birth
d) Address
e) Education History
f) Employment History
g) Medical History
h) Blood type
i) Race
j) Religion
k) Photo
l) Personal Information and Associated Research Data

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:
Samantha Soong Jia Yie (Samantha22@1utar.my)
Vaneesha Sauvilei A/P Visvanathan (vaneesha03@1utar.my)

Acknowledgment 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.

← →

Instructions: Please fill in your personal details or circle **ONE** option.

1. Age: _____

2. Gender:

- ◯ Male
- ◯ Female
- ◯ Prefer not to say

3. Race:

- ◯ Malay
- ◯ Indian
- ◯ Chinese
- ◯ Others. (Specify: _____)

4. Nationality

- ◯ Malaysian
- ◯ Non Malaysian

5. Current education level:

- ◯ Diploma
- ◯ Degree
- ◯ Master's Degree
- ◯ Postgraduate Degree
- ◯ Others. (Specify: _____)

6. Name of affiliated university or institution: (E.g. Universiti Tunku Abdul Rahman)

7. Do you own a smartphone?

- ◯ Yes
- ◯ No

8. Frequency of smartphone usage per day (hours)

- ◯ 1 - 3
- ◯ 4 - 6
- ◯ 7 - 9
- ◯ 10 - 12

Appendix B

Calculation of Effect Size

Social Anxiety

Table 2.

Study 1—Pearson *r* correlations between questionnaires and Smartphone Addiction Scale scores (*n* = 140).

Factor	SAS	LSAS	LSAS—Social Fear	LSAS—Social Avoidance
SAS				
LSAS	0.56 **			
LSAS—social fear	0.57 **	0.98 **		
LSAS—social avoidance	0.54 **	0.99 **	0.94 **	

$$f_1^2 = \frac{0.56^2}{1 - 0.56^2} = 0.4569$$

Turgeman, L., Hefner, I., Bazon, M., Yehoshua, O., & Weinstein, A. (2020). Studies on the relationship between social anxiety and excessive smartphone use and on the effects of abstinence and sensation seeking on excessive smartphone use. *International Journal of Environmental Research and Public Health*, *17*(4), 1262. https://doi.org/10.3390/ijerph17041262

Stress

Correlations among study variables.

Measures	1	2	3	4
1. SPA		0.375**	0.253**	0.328**
2. Depression			0.731**	0.778**
3. Anxiety				0.708**
4. Stress				

$$f_2^2 = \frac{0.328^2}{1 - 0.328^2} = 0.1206$$

Sarhan, A. L. (2024). The relationship of smartphone addiction with depression, anxiety, and stress among medical students. *SAGE Open Medicine*, *12*. https://doi.org/10.1177/20503121241227367

Boredom Proneness

Table 3. Correlation coefficient matrix and square roots of AVEs.

	1	2	3	4	5	6
1. Flow experience	0.912					
2. Sensation seeking	−0.174	**0.763**				
3. Smartphone addiction	0.311	−0.025	**0.780**			
4. Pastime	0.262	0.008	0.292	**0.841**		
5. Boredom proneness	0.137	0.113	0.287	0.442	**0.800**	
6. Self-regulation	−0.085	0.242	−0.228	−0.005	−0.070	**0.782**

$$f_3^2 = \frac{0.287^2}{1 - 0.287^2} = 0.0898$$

Wang, Z., Yang, X., & Zhang, X. (2020). Relationships among boredom proneness, sensation seeking and smartphone addiction among Chinese college students: Mediating roles of pastime, flow experience and self-regulation. *Technology in Society*, *62*, 101319. https://doi.org/10.1016/j.techsoc.2020.101319

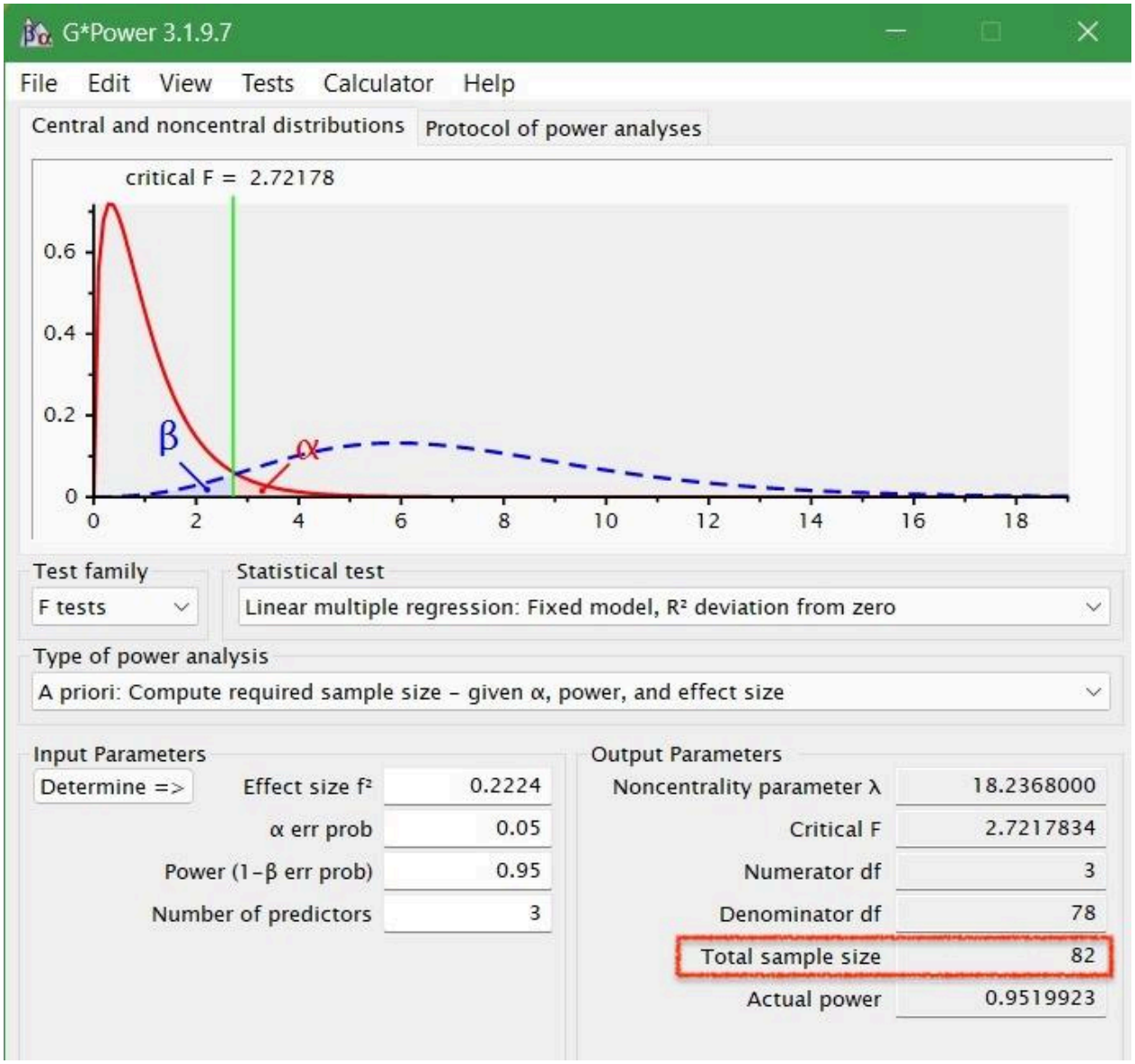
Total effect size

$$f^2 = \frac{(0.4569 + 0.1206 + 0.0898)}{3}$$

$= 0.2224$, small effect size

Appendix C

G*Power Programme Analysis



Appendix D

Ethical Approval Letter

UNIVERSITI TUNKU ABDUL RAHMAN DU012(A)
Wholly owned by UTAR Education Foundation Co. No. 578227-M

Re: U/SERC/78-457/2025

18 February 2025

Dr Lee Wan Ying
Head, Department of Psychology and Counselling
Faculty of Arts and Social Science
Universiti Tunku Abdul Rahman
Jalan Universiti, Bandar Baru Barat
31900 Kampar, Perak.

Dear Dr Lee,

Ethical Approval For Research Project/Protocol

We refer to the application for ethical approval for your students' research project from Bachelor of Social Science (Honours) Psychology programme enrolled in course UACC3006. We are pleased to inform you that the application has been approved under Expedited Review.

The details of the research projects are as follows:

No	Research Title	Student's Name	Supervisor's Name	Approval Validity
1.	The Predictive Roles of Social Anxiety, Stress and Boredom Proneness on Smartphone Addiction Among University Students in Malaysia	1. Samantha Soong Jia Yie 2. Vaneesha Sauvilei	Dr T'ng Soo Ting	18 February 2025 – 17 February 2026

The conduct of this research is subject to the following:

(1) The participants' informed consent be obtained prior to the commencement of the research;

(2) Confidentiality of participants' personal data must be maintained; and

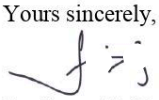
(3) Compliance with procedures set out in related policies of UTAR such as the UTAR Research Ethics and Code of Conduct, Code of Practice for Research Involving Humans and other related policies/guidelines.

(4) Written consent be obtained from the institution(s)/company(ies) in which the physical or/and online survey will be carried out, prior to the commencement of the research.

Should the students collect personal data of participants in their studies, please have the participants sign the attached Personal Data Protection Statement for records.

Thank you.

Yours sincerely,



Professor Ts Dr Faidz bin Abd Rahman
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, Faculty of Arts and Social Science
Director, Institute of Postgraduate Studies and Research

Appendix E

Reliability of Instrument in Pilot Study

Social Anxiety: SIAS-6

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.842	.844	6

Stress: PSS-10

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.825	.818	10

Boredom Proneness: SBPS

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.904	.903	8

Smartphone Addiction: SAS-SV

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.881	.883	10

Appendix F

Reliability of Instrument in Actual Study

Social Anxiety: SIAS-6

Reliability Statistics

Cronbach's Alpha	N of Items
.864	6

Stress: PSS-10

Reliability Statistics

Cronbach's Alpha	N of Items
.747	10

Boredom Proneness: SBPS

Reliability Statistics

Cronbach's Alpha	N of Items
.869	8

Smartphone Addiction: SAS-SV

Reliability Statistics

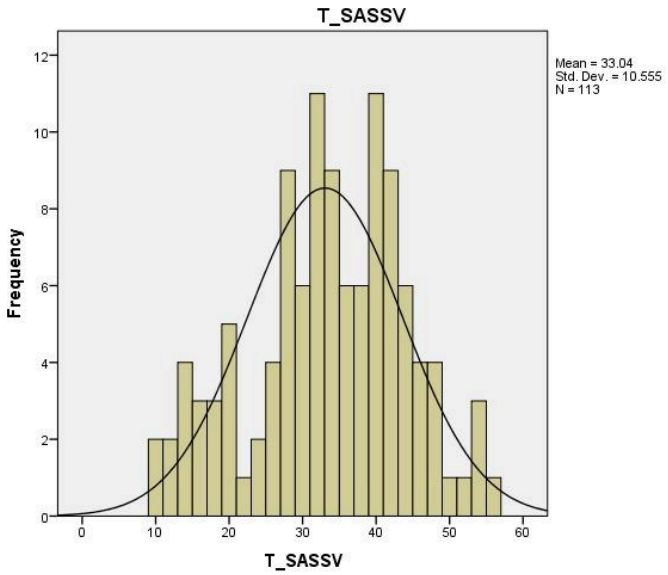
Cronbach's Alpha	N of Items
.897	10

Appendix G

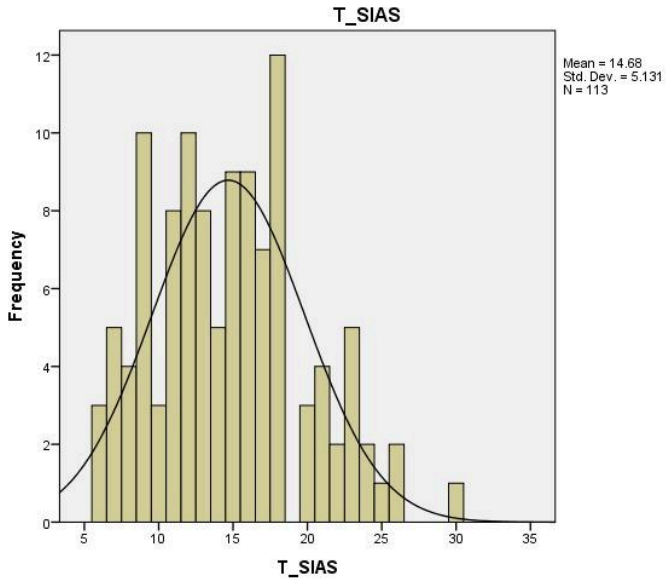
Histogram

Histogram for Each Distribution

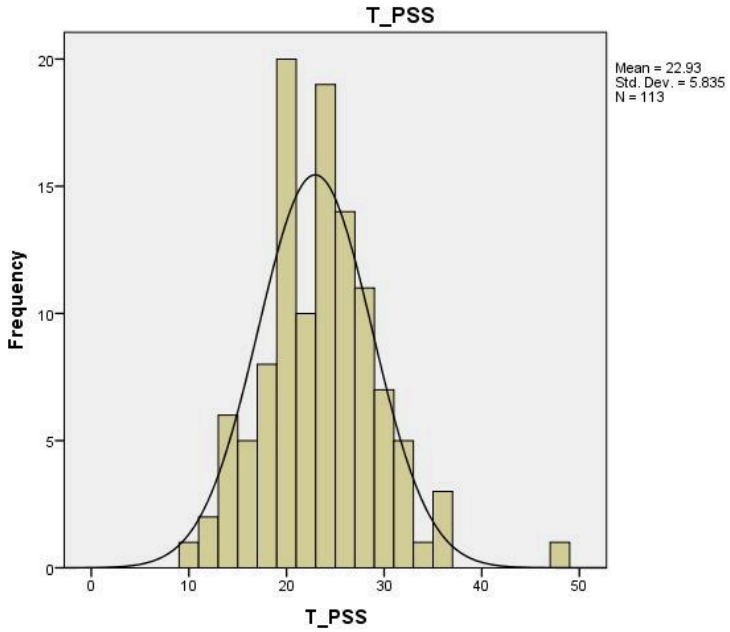
Smartphone Addiction



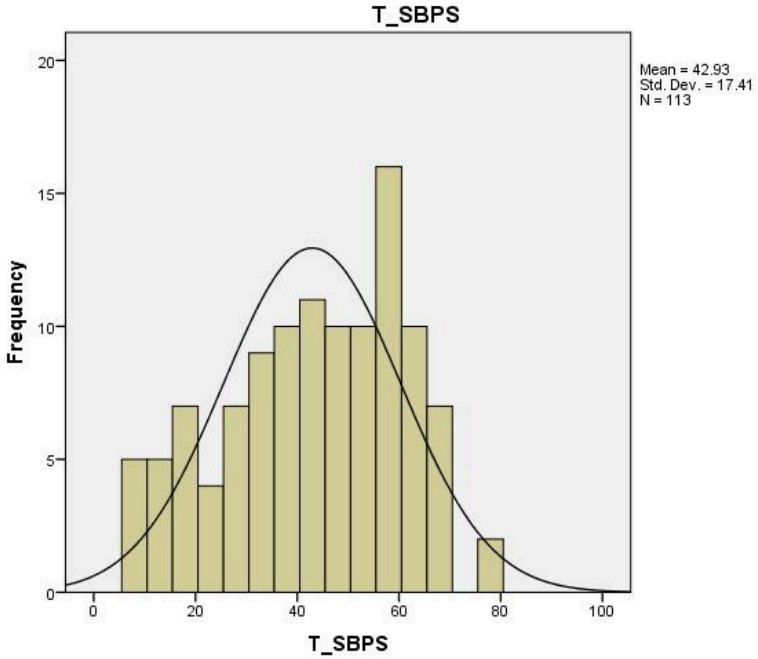
Social Anxiety



Stress



Boredom Proneness

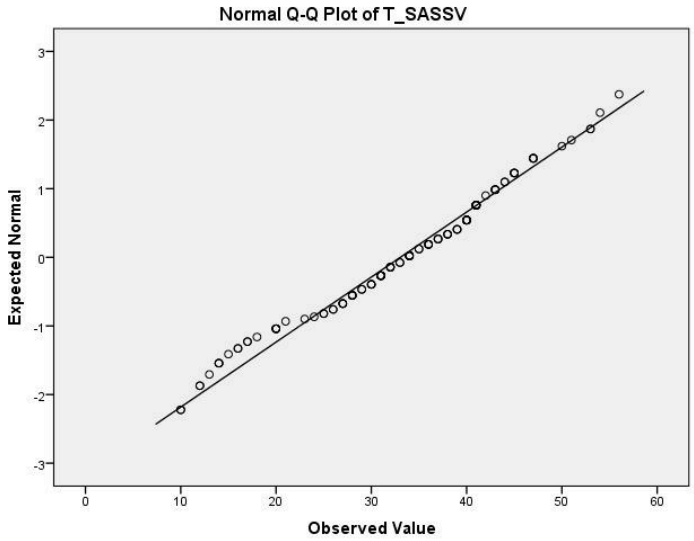


Appendix H

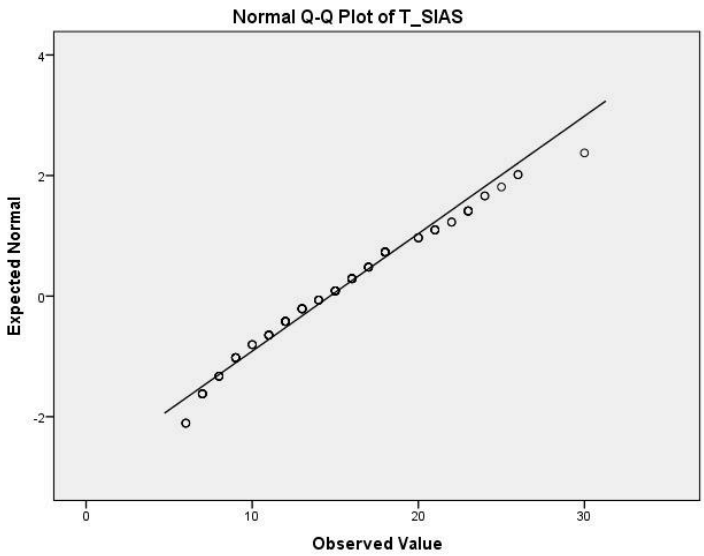
Quantile-Quantile Plot

Normal Q-Q Plot for Each Distribution

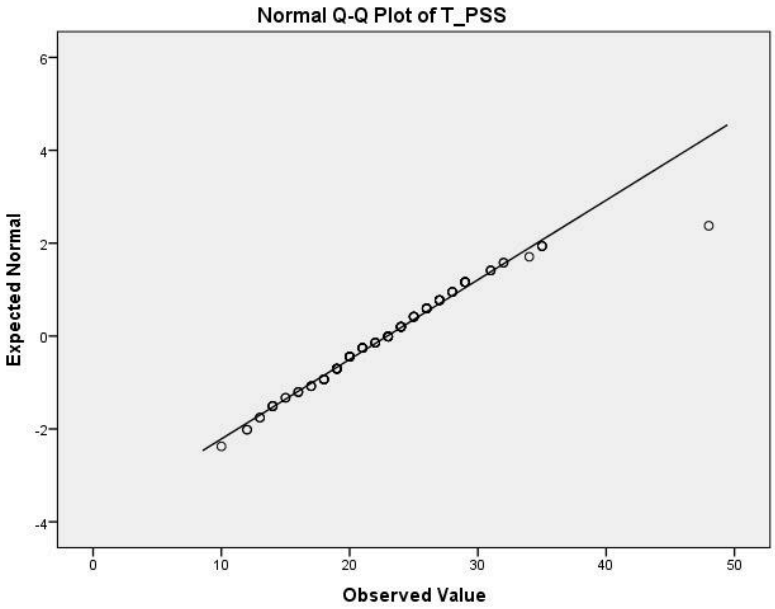
Smartphone Addiction



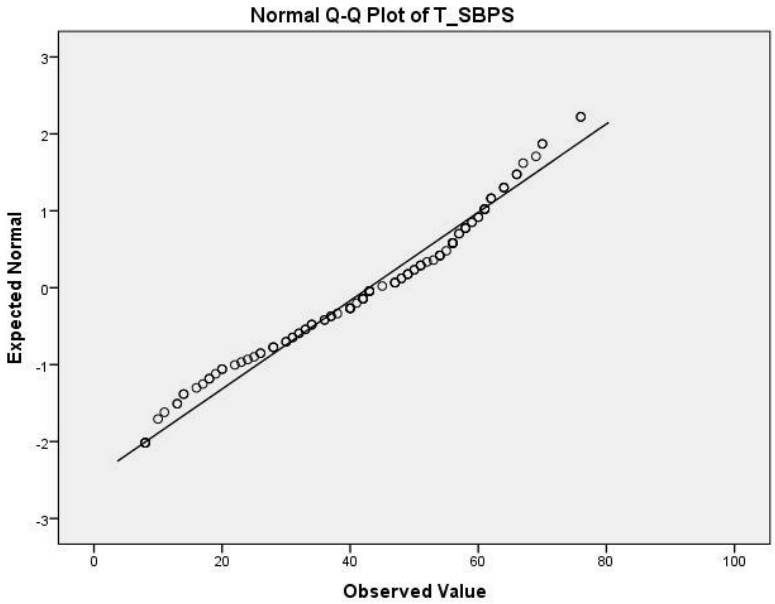
Social Anxiety



Stress



Boredom Proneness



Appendix I

Kolmogorov-Smirnov Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
T_SASSV	.072	113	.199	.978	113	.055
T_SIAS	.082	113	.060	.972	113	.018
T_PSS	.064	113	.200*	.967	113	.007
T_SBPS	.092	113	.021	.965	113	.005

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

a. Lilliefors Significance Correction

Appendix J

SPSS Output: Outliers

Casewise Diagnostics[a]

Case Number	Std. Residual	T_SASSV	Predicted Value	Residual
14	-2.239	27	44.77	-17.773
58	-4.075	14	46.35	-32.352
105	2.007	47	31.07	15.932

a. Dependent Variable: T_SASSV

Case Summaries

Case Summaries[a]

			Case Number	Mahalanobis Distance	Cook's Distance	Centered Leverage Value
Group_IC	0	1	1	5.85254	.01576	.05225
		2	2	4.74966	.00100	.04241
		3	3	3.60851	.00465	.03222
		4	4	1.36808	.01029	.01222
		5	5	2.19956	.00114	.01964
		6	6	3.46316	.01342	.03092
		7	7	1.53930	.00363	.01374
		8	8	1.57719	.00913	.01408
		9	9	2.88813	.01098	.02579
		10	10	10.66459	.03727	.09522
		11	11	4.71247	.00508	.04208
		12	12	1.14085	.00959	.01019
		13	13	.95339	.00726	.00851
		14	15	2.74465	.00019	.02451
		15	16	1.86656	.00078	.01667
		16	17	3.59311	.00002	.03208
		17	18	.49665	.00033	.00443
		18	19	1.25968	.01618	.01125
		19	20	4.15614	.00654	.03711
		20	21	1.93222	.00793	.01725
		21	22	4.11213	.02623	.03672
		22	23	3.78352	.02034	.03378
		23	24	6.61381	.00435	.05905
		24	25	.84961	.00297	.00759
		25	26	6.97677	.01984	.06229
		26	27	2.47968	.00628	.02214
		27	28	.55018	.00017	.00491
		28	29	4.94231	.01515	.04413
		29	30	2.63030	.00290	.02348
		30	31	2.01209	.01622	.01797
		31	32	3.62849	.00613	.03240
		32	33	1.65392	.00040	.01477
		33	34	1.70100	.01572	.01519
		34	35	1.75229	.00139	.01565
		35	36	.47957	.00801	.00428
		36	37	2.25167	.00174	.02010
		37	38	3.31018	.01803	.02956
		38	39	6.01777	.01318	.05373
		39	40	3.73808	.00499	.03338
		40	41	.22746	.00049	.00203
		41	42	.88581	.00028	.00791
		42	43	3.93941	.01113	.03517
		43	44	3.71878	.00236	.03320
		44	45	.87841	.00197	.00784
		45	46	1.93270	.00009	.01726

	46		47	4.62176	.00949	.04127
	47		48	1.24626	.01520	.01113
	48		49	4.09204	.00303	.03654
	49		50	.84643	.00186	.00756
	50		51	6.35247	.00450	.05672
	51		52	2.52267	.00008	.02252
	52		53	30.09819	.00423	.26873
	53		54	5.23904	.00037	.04678
	54		55	1.09383	.00235	.00977
	55		56	.14346	.00136	.00128
	56		57	.02188	.00007	.00020
	57		59	.88581	.00006	.00791
	58		60	2.71145	.01052	.02421
	59		61	6.90951	.00233	.06169
	60		62	2.80067	.00166	.02501
	61		63	.87200	.00348	.00779
	62		64	3.20953	.02536	.02866
	63		65	2.71145	.01907	.02421
	64		66	4.00622	.00016	.03577
	65		67	2.27226	.00592	.02029
	66		68	.73917	.00213	.00660
	67		69	4.78528	.01172	.04273
	68		70	5.09326	.05941	.04548
	69		71	.57431	.00445	.00513
	70		72	4.31636	.00326	.03854
	71		73	1.11282	.00014	.00994
	72		74	.93343	.00554	.00833
	73		75	2.52033	.00554	.02250
	74		76	1.14392	.00103	.01021
	75		77	1.41960	.00574	.01268
	76		78	.96617	.00241	.00863
	77		79	1.56750	.00396	.01400
	78		80	4.58767	.01796	.04096
	79		81	3.04082	.00741	.02715
	80		82	2.99977	.00227	.02678
	81		83	2.36097	.00881	.02108
	82		84	1.51379	.00039	.01352
	83		85	4.99639	.00184	.04461
	84		86	5.79794	.00025	.05177
	85		87	3.94145	.00354	.03519
	86		88	1.42335	.00394	.01271
	87		89	3.75341	.00000	.03351
	88		90	1.86471	.00014	.01665
	89		91	.73553	.00389	.00657
	90		92	2.34801	.00139	.02096
	91		93	4.09988	.00196	.03661
	92		94	2.78058	.00092	.02483
	93		95	1.08204	.00096	.00966
	94		96	1.05946	.00622	.00946
	95		97	.22050	.00379	.00197
	96		98	1.07902	.00437	.00963
	97		99	3.20819	.00040	.02864
	98		100	6.45441	.01320	.05763
	99		101	3.00480	.00002	.02683
	100		102	1.39688	.02170	.01247
	101		104	1.26453	.00452	.01129
	102		105	1.94999	.02789	.01741
	103		106	3.04082	.00133	.02715
	104		107	3.05708	.00028	.02730
	105		108	3.43119	.00753	.03064
	106		109	3.07164	.00841	.02743
	107		110	1.12853	.00469	.01008
	108		111	.98244	.00151	.00877
	109		112	.97699	.00337	.00872
	110		113	4.01415	.01025	.03584
	Total	N		110	110	110
1	1		14	3.30761	.05201	.02953
	2		58	5.77001	.28389	.05152
	3		103	.59391	.00006	.00530
	Total	N		3	3	3
Total	N			113	113	113

a. Limited to first 150 cases.

Appendix K

SPSS Output: Multiple Linear Regression Analysis

Variance Inflation Factor (VIF) Values and Tolerance Values

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	9.300	3.278		2.837	.005		
	T_SIAS	.803	.187	.390	4.284	.000	.608	1.644
	T_PSS	.174	.140	.096	1.242	.217	.840	1.190
	T_SBPS	.185	.056	.306	3.308	.001	.592	1.691

a. Dependent Variable: T_SASSV

Durbin-Watson Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.670[a]	.450	.434	7.939	2.109

a. Predictors: (Constant), T_SBPS, T_PSS, T_SIAS

b. Dependent Variable: T_SASSV

Regression Model

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5609.398	3	1869.799	29.669	.000[b]
	Residual	6869.380	109	63.022		
	Total	12478.779	112			

a. Dependent Variable: T_SASSV

b. Predictors: (Constant), T_SBPS, T_PSS, T_SIAS

Regression Coefficient

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	9.300	3.278		2.837	.005		
	T_SIAS	.803	.187	.390	4.284	.000	.608	1.644
	T_PSS	.174	.140	.096	1.242	.217	.840	1.190
	T_SBPS	.185	.056	.306	3.308	.001	.592	1.691

a. Dependent Variable: T_SASSV