



SELF-CONTROL, CHRONOTYPE, AND FUTURE TIME PERSPECTIVE  
AS PREDICTORS OF BEDTIME PROCRASTINATION  
AMONG MALAYSIAN YOUNG ADULTS

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ON BEDTIME PROCRASTINATION

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Predictors of Bedtime Procrastination among Malaysian Young Adults

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# SELF-CONTROL, CHRONOTYPE, AND FUTURE TIME PERSPECTIVE ON BEDTIME PROCRASTINATION

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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 acknowledgement has been given in the bibliography and references to ALL sources be they printed, electronic or personal.

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SELF-CONTROL, CHRONOTYPE, AND FUTURE TIME PERSPECTIVE  
ON BEDTIME PROCRASTINATION

APPROVAL FORM

This research paper attached hereto, entitled “Self-Control, Chronotype, and Future Time Perspective as Predictors of Bedtime Procrastination among Malaysian Young Adults” prepared and submitted by “Isaac Law Lik Jun, Leong Syn Jieh, and Tan Hor Yinn” in partial fulfillment of the requirements for the Bachelor of Social Science (Hons) Psychology is hereby accepted.



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Supervisor

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**Abstract**

Bedtime procrastination, a behaviour of voluntarily delaying bedtime by sleeping later than the intended time, is a prevalent issue in modern society, yet being understudied in the Malaysian context. It brings health-interfering impacts such as sleep deficiency, which in turn could affect the physical and mental health of the individual. This research aims to study the predictive effects of self-control, chronotype and future time perspective on bedtime procrastination among young adults in Malaysia. This study hypothesised that self-control, chronotype and future time perspective could negatively predict bedtime procrastination. Quantitative cross-sectional study design was implemented. Convenience sampling method was employed for data collection by distributing the Qualtrics online survey on platforms such as Facebook, Instagram, WhatsApp, Wechat, and Xiaohongshu. Bedtime Procrastination Scale (BPS), Brief Self-Control Scale (BSCS), Morningness-Eveningness Questionnaire (MEQ), and Zimbardo Time Perspective Inventory (ZTPI) Future Subscale were administered in this study. The participants are Malaysian young adults between 18 and 29 who are not working on shift or having sleep problems. The final total number of responses included in the study is 108. Multiple Linear Regression analysis was run to test the hypotheses of the study. The findings revealed that self-control significantly and negatively predicts bedtime procrastination, while chronotype significantly and positively predicts bedtime procrastination. However, future time perspective is not a significant predictor of bedtime procrastination. This study provides insights into the concept of bedtime procrastination and a direction for future studies to further explore the underlying factors of bedtime procrastination. It also provides information for practitioners to design effective interventions to reduce bedtime procrastination.

*Keywords:* bedtime procrastination, self-control, chronotype, future time perspective, young adults, Malaysia

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**List of Abbreviations**

Abbreviations

ACM	Ambulatory circadian monitoring
BPS	Bedtime Procrastination Scale
BSCS	Brief Self-Control Scale
CD	Cook's Distance
CL	Centered Leverage
FTP	Future Time Perspective
K-S	Kolmogorov-Smirnov
MCII	Mental contrasting with implementation intentions
MD	Mahalanobis Distance
MEQ	Morningness-Eveningness Questionnaire
MLR	Multiple Linear Regression
Q-Q Plot	Quantile-Quantile Plot
SST	Socioemotional selectivity theory
TST	Temporal Self-Regulation Theory
VIF	Variance Inflation Factor
ZTPI	Zimbardo Time Perspective Inventory

## Chapter 1

### Introduction

#### 1.1 Background of Study

Procrastination is a prominent and prevalent phenomenon that has been taken note of over the past decades. It is a self-regulatory failure that involves voluntarily postponing an intended behaviour despite the adverse outcomes of such delay (Klingsieck, 2013; Rozental & Carlbring, 2014). People who procrastinate are unable to guide their goal-directed actions toward healthy lifestyles (Ferrari & Díaz-Morales, 2014). As procrastination has been associated with various negative consequences such as poor performance, poor mental health, and lower well-being (Ferrari & Díaz-Morales, 2014; Steel & Ferrari, 2013), previous researchers have conducted studies on general procrastination (Przepiórka et al., 2019; Zabelina et al., 2018), in the hope of understanding this phenomenon better in order to mitigate the negative consequences of such behaviour. Many past studies have given attention to several domains of procrastination, primarily academic or workplace procrastination (Prem et al., 2018; Siah et al., 2021). However, as humans are highly complex and volatile, the tendency to procrastinate is not only displayed in academic or workplace contexts but can also be illustrated in a wide array of day-to-day behaviours such as responding to text messages, doing laundry, or even going to bed. In this study, the researchers will focus on a specific type of procrastination: bedtime procrastination.

Bedtime procrastination is a concept raised by Kroese et al. (2014a), describing the behaviour of not going to bed at the intended time without external reasons for such behaviour, which requires that the negative consequences of such behaviour are known by the individual (Liang, 2020). Such habitual failure to adhere to planned bedtime was linked to

shorter sleep, lower subjective sleep quality, and daytime fatigue (Massar & Chee, 2019). In this day and age, bedtime procrastination is a common phenomenon in modern society (Geng et al., 2021). Theoretically, people procrastinate activities that are aversive, but going to bed is not something aversive but most people find sleeping enjoyable (Magalhães et al., 2020). Bedtime procrastinators explained that the procrastination started deliberately (i.e., knowingly and intentionally) but eventually they lost track of time (Nauts et al., 2018).

A journalist, Lee (2020) posted on Twitter, referring this term to the phenomenon when people have little or no control over their daytime activities, they refuse to sleep on time to restore a sense of freedom at late night. Researchers also postulated that if someone has fewer self-regulatory resources available due to depletion after daytime obligations, they will more likely procrastinate sleep to reward themselves with some leisure at targeted bedtime (Kamphorst et al., 2018; Nauts et al., 2018). In line with this statement, differences between weekday and weekend nights in terms of bedtime procrastination have been discovered (Pu et al., 2022). Alternatively, Kühnel et al. (2018) explained that people procrastinate bedtime as a choice to employ self-control, such that they choose to do other things, rather than sleeping to restore their resources, when they are able to control their activities at night.

Based on past research, self-control could be one of the predictors of bedtime procrastination (Exelmans & Van den Bulck, 2021; Mao et al., 2022). Self-control refers to the capacity of an individual to override or alter their undesired, dominant response and behavioural tendencies as well as to regulate their thoughts, emotions, and behaviour (Carver & Scheier 1981; Carver & Scheier, 1982; Tangney et al., 2004; Vohs & Baumeister 2004). Self-control enables individuals to refrain from unbeneficial actions and enhances their motivation to initiate a task that is in line with self or social expectations to pursue long-term



goals (Baumeister et al., 2007; Przepiórka et al., 2019). According to research, self-control could be distinguished into trait self-control and state self-control (Tangney et al., 2004). Schmitt and Blum (2020) explained that traits are the individual's patterns of thinking, feeling, and behaviours consistent across time and situations. Unlike traits, states refer to the individual's patterns of thinking, feeling, and behaviours at a specific situation and time. The current study focuses on the trait self-control as the predictor of bedtime procrastination. This is because the present study would like to assess the individual's trait measure of dispositional self-control that is stable across time and situations rather than the state self-control, which may vary across time according to the concrete situations encountered by the individual.

Past scholars viewed the trait self-control as one of the self-regulation's dominant constructs (de Ridder et al., 2012; Kroese et al., 2014b). Self-regulation refers to one's ability to modify their feelings, desires, thinking and behaviours according to their goals (de Ridder & De Wit, 2006; Kadzikowska-Wrzosek, 2018b). As procrastination is considered a self-regulatory failure, studying self-control as a predictor of bedtime procrastination is logically plausible. The present study hypothesises that individuals with high levels of the trait self-control are less likely to engage in bedtime procrastination as they have a higher capacity to inhibit undesired behavioural tendencies to pursue their long-term goals such as waking up early in the morning without feeling tired.

Besides that, the present study also suggests chronotype as a predictor of bedtime procrastination. Chronotype, commonly referred to as individual differences in sleep and wake rhythms (Kühnel et al., 2018). This term can be explained using two different perspectives: biological and psychological. From the biological aspect, it refers to an individual's differences in circadian rhythm, also known as the biological clock, while from

the psychological aspect, it is the term used to describe an individual's sleep and wake preferences (Kadzikowska-Wrzosek, 2018a). Chronotype falls on a continuum that extends from extreme morningness to extreme eveningness (Taylor & Hasler, 2018). Individuals who prefer to sleep earlier and are more active during daytime are often called early "larks" while those who prefer to sleep later and rise later are known as late "owls" (Roenneberg et al., 2003).

Chronotype has been found to be associated with individual psychological traits which in turn results in differences on preferred timing of sleep and activity among individuals (Lenneis et al., 2021). Besides that, according to Roenneberg et al. (2003), an individual's chronotype can also be influenced by three different clocks which are biological clock, social clock, and solar clock. This explains that there are many different aspects that could explain the differences of individual chronotype. Thus, this study aims to investigate if chronotype predicts bedtime procrastination behaviour among young adults in Malaysia.

Additionally, time perspective is the individual differences in the perception of time which explains the degree to which individuals subjectively recall the past, experience the present, and/or look forward to the future (Husman & Shell, 2008). It is a conceptual model originally developed by Zimbardo and Boyd (1999), who regarded time perspective as a relatively stable view that likely evolves with age, which may also be affected by situational factors such as the experience of time-bound activities (e.g., school assignments, job tasks, childbirth; Kastenbaum, 1982). The theory comprises three dimensions of time, which are past, present, and future, and consists of five orientations, namely past-positive, past-negative, present-hedonistic, present-fatalistic, and future (Zimbardo & Boyd, 1999). This subjective perception of time that varies across individuals is shaped by personal experiences

as well as social and cultural influences, which people typically are not aware about how oriented they are to perceive time (Zimbardo & Boyd, 2008).

Across all dimensions of time perspective, future time perspective (FTP) was found to have a stronger association with procrastination (Sirois, 2014) and health-related behaviour (Meng et al., 2021a). As such, the present study focuses on examining FTP as a predictor of bedtime procrastination. Future time perspective (FTP) refers to one's thought about and concern for their future (Kooij et al., 2018; Mohammed & Marhefka, 2020), and how they perceive their future time left (Henry et al., 2017; Rohr et al., 2017), ranging from being limited (i.e., low FTP) to expansive (i.e., high FTP, Lang & Carstensen, 2002). According to an early researcher (Lewin, 1939), FTP is described as the length of time in the future that will affect how people act in the present. Especially, how people perceive about their future time influences their health-related behaviour (Hall & Fong, 2007), such as bedtime procrastination (Chung et al., 2020; Okay et al., 2022). Okay et al. (2022) proposed that sleep time corresponds to one's perception of ending the day, postulating that sleep-related behaviour (e.g., bedtime procrastination) is explained by one's subjective perception of time, which is FTP. When people perceive their time left as limited, they tend to focus more on immediate satisfaction because the future outcomes are seen as less attainable (Hicks et al., 2012).

FTP views time as an individual psychological construct rather than as a shared physical entity (Husman & Shell, 2008). Kooij et al. (2018) distinguished FTP from personality traits that describe how one is likely to experience events and make affective and behavioural responses. Instead, they described FTP as an adaptable cognitive-motivational construct that regulates one's tendency to plan and anticipate the future.

The complexity of society including societal values and perceived opportunities may influence people's future time perspective (McInerney, 2004). The author pointed out that the rapidity of change and uncertainty about the future influence future time perspective, such that the rapidity of change may motivate the current generation to be more concerned about and engaged with future; while the uncertainty about future may also make them uninvolved and disengaged about the future.

## **1.2 Problem Statement**

Bedtime procrastination is a common issue that escalates in the current population (Kamphorst et al., 2018; Nauts et al., 2016). Primarily, bedtime procrastinators fail to act in a way that supports their long-term goals. Bedtime procrastination predominantly leads to sleep deficiency, poor sleep quality and daytime fatigue (Kroese et al., 2014b; Ma et al., 2022), which subsequently brings negative impacts on physical and mental health (Guo et al., 2020; Kroese et al., 2016). A study by Chung et al. (2020) regarded bedtime procrastination as a serious health-interfering behaviour because it is negatively associated with young adults' mood and sleep. Several past studies have found that high and significant depression and anxiety levels are reported among individuals who engaged in bedtime procrastination as they experienced poorer sleep quality (Chung et al., 2020; Guo et al., 2020; Rubin, 2020). Besides interfering mental health, sleep deficiency, which may be caused by bedtime procrastination, is also linked to the risk of developing hypertension and might serve as a trigger for cardiovascular events (Fang et al., 2012; Sekine et al., 2010). Sleep deprivation also affects the individual's cognitive domains such as working memory, ability to make decisions, and attention (Diekelmann & Born, 2010).

In a recent study (Naito et al., 2021), it was found that more than half of the participants, who were undergraduate students in Malaysia, were sleep deprived (i.e., less

than 7 hours). Although most previous research has been focusing on the association between sleep deprivation and sleep disorders such as insomnia, Kroese et al. (2014a) proposed that many people experience sleep deprivation simply because they go to bed late without suffering from any sleep disorder. The study by Kroese et al. (2014b) reported that a large number of the general population procrastinate in going to bed, which suggests that bedtime procrastination is a prominent issue among the general population in modern society.

Furthermore, a study in Korea demonstrated that about half of their young adult participants are classified under the high bedtime procrastination group (Chung et al., 2020). This finding is consistent with another study by Herzog-Krzywoszanska and Krzywoszanski (2019), which observed that higher Bedtime Procrastination Scale scores were reported among the younger participants in Poland. According to Schwarz et al. (2019), mood impairment is stronger among young adults after sleep deprivation. This shows that bedtime procrastination is a prevalent health-interfering behaviour among young adults in modern society. Hence, young adults serve as an interest for the research sample in this study.

Additionally, a survey by Philips (2021), a health technology company, reported that 84% of the people surveyed used their smartphones before bed, which was 10% more people as compared to a year before. People know that sleeping late could bring negative effects on sleep quality, subsequent work performance, and health; but they still procrastinate on bedtime. Nauts et al. (2018) interviewed 17 participants inclusive of students and working adults and analysed that people delay their bedtime doing activities that they enjoy doing, as they think they deserve that time after a busy day fulfilling their obligations, knowing that it is at the expense of having enough sleep.

Particularly, studies examined the factors of sleep deprivation but rarely focused on bedtime procrastination in the psychological context (Naito et al., 2021; Peltzer & Pengpid,

2019). Besides that, there is a lack of literature regarding bedtime procrastination in the Malaysian context, but rather in China (Chen et al., 2022; Mao et al., 2022), Belgium (Exelmans & Van den Bulck, 2021), Korea (Chung et al., 2020), Poland (Przepiórka et al., 2019), and Turkey (Okay et al., 2022). Thus, the current research aims to fill in the gap considering the possible differences regarding sleep patterns across different countries by studying bedtime procrastination among Malaysian young adults and focus on self-control, chronotype, and future time perspective as predictors.

Although recent studies have found the relationship between self-control and bedtime procrastination (Exelmans & Van den Bulck, 2021; Kadzikowska-Wrzosek, 2018b, Kroese et al., 2014a), past studies that examined the relationship between these two variables are still scarce as compared to the number of researches which have studied the relationship between self-control and general procrastination, or other forms of procrastination such as academic procrastination (Kim et al., 2017; Przepiórka et al., 2019; Uzun et al., 2020). Past studies revealed that lower self-control could lead young adults to procrastinate (Kim et al., 2017; Przepiórka et al., 2019). However, the past studies were all conducted in the overseas context such as in Poland (Przepiórka et al., 2019) and Korea (Chung et al., 2020), and majority of the past studies were focusing on other domains of procrastination among the young adults rather than the bedtime procrastination. Considering that mood impairment is stronger among the young adults after sleep deprivation (Schwarz et al., 2019) and higher Bedtime Procrastination Scale scores were reported among the younger participants in the overseas context (Herzog-Krzywoszanska & Krzywoszanski, 2019), this study aims to fill in the gaps for the local literature by studying self-control as the predictor of bedtime procrastination among Malaysian young adults.

On the other hand, this study also aims to investigate the relationship between chronotype and bedtime procrastination in the Malaysian context, as there is limited research that studies the relationship between these two variables. Most of the research on these variables has been conducted in other countries such as among Polish adolescents (Kadzikowska-Wrzosek, 2018a) and undergraduate students (Przepiórka et al., 2019), China university students (Meng et al., 2021), and young adults in Korea (Chung et al., 2020). The findings reported by different past studies also show that there is a significant negative relationship between bedtime procrastination and chronotype (Chung et al., 2020; Hairston & Shpitalni, 2016; Kadzikowska-Wrzosek, 2018a; Kühnel et al., 2018; Przepiórka et al., 2019); however, there is an inconsistent finding that a lower chronotype score is not positively associated with bedtime procrastination (Kadzikowska-Wrzosek, 2018b). Thus, this study aims to investigate if chronotype predicts bedtime procrastination among young adults in Malaysia and if this study will obtain the same results as what past studies have reported.

In terms of FTP, young adults were found to perceive more ambiguity towards the future, as compared to middle-aged and older adults (Brothers et al., 2014). Kooij et al. (2018) also inferred that young adults are less attuned to their future as compared to older adults, which may be related to more health-risk behaviour such as bedtime procrastination (Meng et al., 2021a). Molinari et al.'s (2016) study on a sample of Italian young adults revealed a positive association between unpleasant perceptions about one's future and spontaneous decision-making and avoidance. Several studies examined higher levels of bedtime procrastination among young people who had lower FTP (Chen et al., 2022; Meng et al., 2021a; Okay et al., 2022). With that said, the bias in time perspective, which is more negative, is related to poorer sleep quality, which subsequently impairs life satisfaction among young adults (Rönnlund et al., 2021).

### 1.3 Significance of Study

The current study could inform young adults and the general public in Malaysia about bedtime procrastination to raise awareness of this phenomenon. It may still not be well known by the general public, as people may perform bedtime procrastination as their usual night routine without conceptualising this habit. Considering the undesirable consequences of bedtime procrastination such as sleep deficiency which negatively affects the mental and physical health of the individual, this study is conducted to also draw the public's attention to the examined factors that are related to individual differences.

Fundamentally, the knowledge gaps in research for academic purposes can be filled by the findings of this study about whether self-control, chronotype, and future time perspective predict bedtime procrastination. As there is limited literature on this topic especially in the Malaysian context, this present research can serve as a baseline for future studies in this area. If this study suggests the predicting effects, it helps expand the explanation for bedtime procrastination in the local context, which provides insights to research practitioners to develop effective strategies and interventions that may help bedtime procrastinators go to bed earlier as intended.

Besides that, considering the adverse outcomes of bedtime procrastination, this study aims to extend the findings from previous research to further explore the predictors of bedtime procrastination for prevention and intervention development. Touching upon practical implications, consolidating self-control as the predictor of bedtime procrastination opens up pathways to mitigate the issue itself by learning self-regulatory strategies to enhance the self-control of the individuals. Moreover, the current study intends to view bedtime procrastination from the biological perspective (i.e., chronotype) and the psychological perspective (i.e., FTP; Meng et al., 2021a). By identifying chronotype as a



predictor of bedtime procrastination, it allows individuals to learn about how chronotype influences their sleep and wake time, as well as how to deal with their night-time procrastination behaviour based on this aspect. This study also shed light on future time perspective as a predictor, acknowledging the importance of the orientation of time perspective by highlighting the possible influence of FTP on health-related behaviour, thus calling for strategies of shifting past or present time perspectives to a more future-oriented time perspective.

The findings of this research can also serve as a source of benefits for various parties to implement interventions and strategies to mitigate the issue of bedtime procrastination. These findings could help young adults be more aware of their level of self-control, chronotype, and future time perspective, which might help them prevent bedtime procrastination. For instance, in the academic settings where emerging adults are pursuing their studies, academic institutions could provide workshops that teach the students strategies to increase their self-control. In the workplace setting, the companies could also teach self-control techniques to the employees via training which could help the young adults to overcome the unhealthy behaviour which is bedtime procrastination. Furthermore, in both workplace and educational settings, efforts in adapting young adults' subjective temporal perspective can be established using time-perspective therapy that promotes long-term thinking and goal setting (Hall & Fong, 2003) to reduce health-risk behaviour such as bedtime procrastination. As for chronotype, the healthcare and educational sectors can educate people about their own chronotype. For instance, the ways of identifying one's chronotype and the ways of working in accordance with one's own chronotype.

#### **1.4 Research Objectives**

1. To examine whether self-control predicts bedtime procrastination among Malaysian young adults.
2. To examine whether chronotype predicts bedtime procrastination among Malaysian young adults.
3. To examine whether future time perspective predicts bedtime procrastination among Malaysian young adults.

#### **1.5 Research Questions**

1. Does self-control predict bedtime procrastination among Malaysian young adults?
2. Does chronotype predict bedtime procrastination among Malaysian young adults?
3. Does future time perspective predict bedtime procrastination among Malaysian young adults?

#### **1.6 Hypotheses**

H<sub>1</sub>: Self-control negatively predicts bedtime procrastination among Malaysian young adults.

H<sub>2</sub>: Chronotype negatively predicts bedtime procrastination among Malaysian young adults.

H<sub>3</sub>: Future time perspective negatively predicts bedtime procrastination among Malaysian young adults.

## **1.7 Conceptual Definitions**

### ***1.7.1 Bedtime Procrastination***

Bedtime procrastination, also known as “revenge bedtime procrastination”, is defined as the behaviour of sleeping at a time later than intended (Kroese et al., 2014a), despite knowing the negative impacts of insufficient sleep from sleeping late (Liang, 2020; Nauts et al., 2018). Individuals that engage in bedtime procrastination often associated with the failure of quitting the activities before bedtime (Bernecker & Job, 2020; Pu et al., 2022).

Additionally, for bedtime procrastination to occur, there must be no external causes available to explain the delay (Kroese et al., 2016).

### ***1.7.2 Self-Control***

Self-control can be defined as one’s capacity to overcome their undesired behavioural tendencies and inner response, as well as to alter their cognition, emotions, and behaviours (Carver & Scheier 1981; Carver & Scheier, 1982; Tangney et al., 2004; Vohs & Baumeister 2004). According to Tangney et al. (2004), self-control is related to the psychological and behavioural health areas. These health areas include the individual’s impulse control, psychological adjustment, achievement, moral emotions, and social relationships. Self-control enables one to avoid harmful behaviours and enhances one’s motivation to undertake a task to pursue long-term goals (Baumeister et al., 2007; Przepiórka et al., 2019). According to other scholars, the ability of the individual to delay the instant gratification offered by the smaller reward for a bigger and later reward also reflects self-control (Ainslie, 1975; Kirby & Herrnstein, 1995; Mischel et al., 1989).

### ***1.7.3 Chronotype***

Chronotype can be defined in two ways which are individual differences in preferred sleep and wake timing and individual differences in peak alertness and active time in physical and cognitive activities (Belfry et al., 2020; Wong et al., 2015). Individual endogenous circadian rhythms have widely been used to explain the differences of individual chronotypes as they regulate daily variations in a variety of biological and behavioural processes (Lack et al., 2009). Besides that, individual factors (e.g., age, sex), environmental factors (e.g., changes of brightness), and social factors (e.g., socially imposed time schedules, work schedules, lifestyles) are also found to be able to influence an individual's chronotype. With the absence of these three factors, the circadian rhythm "runs free" (Roenneberg et al., 2003).

### ***1.7.4 Future Time Perspective***

Future time perspective (FTP) is defined as the individual temporal difference of perception and concern for future (Mohammed & Marhefka, 2020), and the perception of time left in life (Lang & Carstensen, 2002). It is the extent to which people anticipate the future or expect their future to be optimal (Phan et al., 2020), in terms of remaining time and remaining opportunities (Allemand & Hill, 2019; Kooij et al., 2014; Zacher & Frese, 2009). It is associated with several aspects, which are one's thoughts, attitudes and feelings about the future, and the behaviour intention that follows (Lyu & Huang, 2016; Schulz & Heckhausen, 1996). The degree of perception of future time being limited to extensive affects people's behaviour at current time (Lang & Carstensen, 2002; Zimbardo & Boyd, 1999).

### ***1.7.5 Young Adults***

Young adults are defined as individuals aged from 18 to 29 years (Arnett, 2015), who are in the young adulthood phase of life where one takes responsibility for themselves (i.e.,

consequences of their own actions), makes independent decisions, and becomes financially independent (Arnett, 2015; Bonnie et al., 2015). Arnett (2015) illustrated that young adults are those who have detached from adolescence, being independent from parents, self-sufficient, and knowing one's own priority. Young adults experience a series of life events from pursuing and completing higher education, entering the workforce, developing relationships, to getting into marriage (Bonnie et al., 2015).

## **1.8 Operational Definitions**

### ***1.8.1 Bedtime Procrastination***

Bedtime Procrastination Scale (BPS) is a 9-item scale developed by Kroese et al. (2014), used to measure the extent to which an individual practises bedtime procrastination in this study. The 5-point Likert scale ranges from 1 (*Almost never*) to 5 (*Almost always*), the total scores range from 9 to 45, while higher scores indicate higher levels of bedtime procrastination.

### ***1.8.2 Self-Control***

The Brief Self-Control Scale (BSCS) which is developed by Tangney et al. (2004) is used to measure the level of self-control in this research. According to the original creators of this scale, the measure is a unidimensional scale with no subscales (Tangney et al., 2004). This is a 13-item scale that uses 5-point Likert scale ranging from 1 (*Not at all*) until 5 (*Very much*). The researchers will add the raw scores from each item to calculate the total score. Total scores range from 13 to 65. Higher scores indicate higher levels of the trait self-control.

### ***1.8.3 Chronotype***

Horne and Ostberg's (1976) Morningness-Eveningness Questionnaire (MEQ) is a scale designed to assess individual diurnal preference. This original scale has 19 items that are made up of 4-point Likert scales and time scales. The final scale used in the actual study consists of 16 items after removing items 12, 14, and 16 to improve the scale reliability.

### ***1.8.4 Future Time Perspective***

The Zimbardo Time Perspective Inventory (ZTPI), developed by Zimbardo and Boyd (1999), contains the future subscale which is aimed to measure one's level of FTP in this research. The original subscale contains 13 items, using a 5-point Likert scale, which ranges from 1 (*Very uncharacteristic*) to 5 (*Very characteristic*). Higher mean scores, ranging from 1 to 5, suggest a higher level of FTP.

### ***1.8.5 Young Adults***

Young adults in this study are individuals aged between 18 through 29 years (Arnett, 2015), who are Malaysian, without sleep problems or disorders (e.g., insomnia, narcolepsy) and do not work on shift rotation or night shift.

## Chapter 2

### Literature Review

#### 2.1 Conceptualising on Bedtime Procrastination

Bedtime procrastination refers to people voluntarily delaying their bedtime beyond a planned time (Bernecker & Job, 2020), often associated with the failure of disengaging from leisure or indulging activities before bedtime (Pu et al., 2022). Moreover, the circumstance of bedtime procrastination requires that external reasons are not available to explain the delay, and the negative consequences of such compromise of sleep time are known (Kroese et al., 2016). A relevant idea, While-in-Bed procrastination, has also been proposed by (Magalhães et al., 2020) such that people engage in behaviours other than sleeping, especially the use of electronic devices (e.g., smartphone, laptop, television) while in bed before sleep (Chung et al., 2020).

Bedtime procrastination is negatively linked to sleep duration and perceived sleep insufficiency (Herzog-Krzywoszanska & Krzywoszanski, 2019; Kadzikowska-Wrzosek, 2018b). Interestingly, Magalhães et al. (2020) found that people who procrastinate bedtime are more likely to keep to a later dinner time and later waking time the next day. Bedtime procrastination can be associated with some underlying factors, though still unclear, such as aversive bedtime preparatory routine (e.g., brushing teeth, changing clothes, etc.; Nauts et al., 2016), bedtime media use (Chung et al., 2020; Exelmans & Van den Bulck, 2016), and simply wanting time for oneself to attain or restore a sense of freedom after fulfilling daytime demands and obligations (Nauts et al., 2018).

## 2.2 Conceptualising on Self-Control

According to Tangney et al. (2004), self-control can be defined as the ability of the individual to override his or her inner responses and to hinder his or her unwanted behavioural tendencies. With this ability, individuals are able to avoid engaging in unbeneficial behaviours. Baumeister et al. (1994) identified four major domains of self-control which are controlling thoughts, emotions, impulses, and performance.

Past scholars inferred self-control to operate as situational or dispositional boundary conditions (Tangney et al., 2004). Situational self-control refers to the state level of self-control which may vary according to the concrete situation encountered at a specific time, whereas dispositional self-control refers to the trait level of self-control which is relatively consistent across time and situations (Schmitt & Blum, 2020). The current research will study the trait self-control as the predictor of bedtime procrastination. Individuals with high dispositional or trait self-control are usually those that are good in managing their lives, controlling their temperament and accomplishing their promises (Tangney et al., 2004). The trait self-control is one of the main indicators of self-regulation (de Ridder et al., 2012), and is negatively related to self-regulatory failure (Tangney et al., 2004).

Self-control can also be defined as one's ability to postpone experiencing an instant gratification for a larger reward in future (Ainslie, 1975; Kirby & Herrnstein, 1995; Mischel et al., 1989). Based on this definition, self-control involves effortful inhibition. This definition also emphasises the self-control dilemma of choosing between a short-term option that offers instant gratification, and a long-term option which comes with the bigger value that is not immediate. The ability to give up the short-term instant reward for the long-term larger reward reflects self-control (Gillebaart, 2018). The "cool" and "hot" systems proposed by Metcalfe and Mischel (1999) explain the human behaviour of resisting temptation when



delaying the gratification task. The ‘hot’ system is fast and provides impulsive behavioural tendencies. On the other hand, the ‘cold’ system is slower and only functions when there are enough resources available such as the energy within the individual. Unlike the ‘hot’ system, the ‘cold’ system is more likely to enable the individual to engage in more rationalised action (Evans, 2008; Kahneman, 2011). This perspective defines self-control as the mechanism that allows overcoming impulses originating from the ‘hot’ system, and allows the ‘cold’ system to take the priority (Gillebaart & de Ridder, 2017).

Individuals with lower trait self-control are more likely to be governed by their impulsive system to seek short-term gratification that comes with a long-term cost (Exelmans & Van den Bulck, 2021). Past study found that lower self-control is linked to health-compromising behaviours such as consuming too much alcohol and snacking unhealthily (Hagger et al., 2019). On the other hand, individuals with higher trait self-control are governed by their reflective system to engage in behaviours that benefit them in the long term (Baumeister & Heatherton, 1996; Tangney et al., 2004). The trait self-control has a positive link to health-promoting behaviours such as exercising and eating healthily (Hamilton et al., 2019; Hankonen et al., 2014). In short, self-control consistently predicts behaviour that is connected to health (Hagger et al., 2019). It appears that having a higher level of self-control is beneficial across an individual’s several life domains.

### **2.3 Conceptualising on Chronotype**

Chronotype, often known as the person’s variances in rest and activity time or in circadian rhythm, has been widely used as a predictor in many previous studies (Kadzikowska-Wrzosek, 2018a; Lin & Chung et al., 2022; Taylor & Hasler, 2018). Individual endogenous circadian rhythms are often used to explain variances in an individual’s daily biological and behavioural processes (Lack et al., 2009). It helps

individuals to adapt and be prepared for change in the physical environment by regulating the timekeeping system within human's body (Vitaletta et al., 2001). Besides that, environmental (e.g., changes of brightness) and individual factors (e.g., age, gender) were found to be the factors that determine individuals' chronotype (Randler, et. al., 2017, as cited in Kadzikowska-Wrzosek, 2018b; Taylor & Hasler, 2018). For instance, individuals' chronotypes are more likely to switch from morningness to eveningness when they enter adolescence. As they age, the chronotype will switch again from eveningness to morningness. In short, individuals display different chronotypes at different ages (Randler et al., 2017).

Over the years, past studies have found that chronotype can influence an individual's mental health and sleep quality, in which morningness type individuals have a better-quality of sleep than eveningness type. (Lin & Chung, 2022; Taylor & Hasler, 2018). Sleep problems such as poor sleep quality, irregular sleep patterns, and inadequate sleep are more likely to be experienced by eveningness type individuals. Due to the misalignment between individual's chosen sleep-wake-time and socially imposed schedules, social jetlag is more common in the eveningness group (Lin & Chung, 2022). In addition, they were also found to have more internalising issues (e.g., depression) than morningness type (Kivela et al., 2018).

#### **2.4 Conceptualising on Future Time Perspective**

Future time perspective is associated with how individuals perceive their future time left (Henry et al., 2017), ranging from being limited (i.e., low FTP) to expansive (i.e., high FTP, Lang & Carstensen, 2002). Kooij et al. (2018) suggested that FTP is the cognitive orientation about the future that is subject to individual differences. Meng et al. (2021a) presented FTP in terms of the cognitive, affective, and behavioural tendencies of an individual, illustrating not only the thoughts about one's future, but also the behaviour and emotions with respect to the future (Lyu & Huang, 2016). FTP is described as the extent to

which people consider their future outcomes as the results of their present behaviour (She et al., 2021), by comparing between distant and immediate consequences (Strathman et al., 1994). Comparing cognitive and affective aspects of FTP, affective FTP is positively associated with optimistic thinking about future outcomes, confidence of accomplishing future goals, and placing greater value for future outcomes; while cognitive FTP is more related to problem solving and prosocial behaviour (de Volder & Lens, 1982).

Researchers have been arguing about the dimensionality of future time perspective. Most of the available instruments measuring FTP view it as a unidimensional construct (Strathman et al., 1994; Zimbardo & Boyd, 1999) that is assessed on a continuum ranging from limited to open. Later, researchers pointed out the importance of considering FTP as multidimensional, suggesting that limitation and openness are two interrelated but separate dimensions (Cate & John, 2007; Zacher & Frese, 2009). In Cate and John's (2007) study, the participants reported their expectation of many future opportunities while simultaneously demonstrating an increasing perception of their future time as being limited. This finding supported that an increase in one aspect (i.e., remaining opportunities) does not correspond to a decrease in another (i.e., remaining time). Brothers et al. (2014) pointed out another dimension of FTP - ambiguous, presenting FTP in three dimensions (i.e., open, ambiguous, and limited). The authors emphasised the possibility that people experience a sense of uncertainty towards their future, in which they would perceive future as ambiguous, especially among young adults.

Based on a meta-analysis study (Kooij et al., 2018), FTP comprises three main dimensions - future orientation, continuity, and affectivity. Future orientation refers to one's cognitive structure that predominantly focuses on the future time; continuity relates to the extent to which the person perceives their present behaviour influences future outcomes;

while affectivity is associated with the optimistic view of future whereby one is confident in achieving future goals.

## **2.5 Self-Control and Bedtime Procrastination**

The transition from intention to behaviour congruent with the intention depends heavily on the self-regulation skills of the individual (Kadzikowska-Wrzosek, 2018b). Hence, self-control is vital for behaviour that allows an individual to get sufficient sleep. For instance, an individual intends to go to bed early so that he can wake up the next day without feeling fatigued. With self-control, an individual is able to avoid caffeinated beverages during the night or refrain from watching an exciting movie which may cause an increase in the level of stimulation that may disrupt their sleep routine (Nauts & Kroese, 2017).

The past study by Exelmans and Van den Bulck (2021) supports the notion that going to bed at the right time requires self-control, as the study found that self-control is a significant negative predictor of bedtime procrastination among adults in Belgium. Moreover, the study by Mao et al. (2022) also found that self-control has the predictive effect on bedtime procrastination among students from different schools and colleges in China. The findings of these two studies are also in line with the study by Geng et al. (2021) that was conducted on Chinese university students. Geng and colleagues (2021) found that self-control is a protective factor for bedtime procrastination. The findings of these studies imply that people with lower self-control are more inclined to procrastinate going to bed on time, whereas people with higher self-control are not likely to engage in bedtime procrastination.

To further consolidate the negative link between self-control and bedtime procrastination, several other past studies have also found that self-control is negatively associated with bedtime procrastination (Kadzikowska-Wrzosek, 2018b; Kroese et al., 2014a; Kroese et al., 2014b). According to several previous researchers who have attempted to

explain the negative link between the two variables, individuals with lower self-control are typically more impulsive and sensitive to the current distractions, temptations and stimuli in their environment as compared to those with higher self-control. Lower self-control individuals are less focused on the longer-term goals and the long-term consequences of such behaviour (Kadzikowska-Wrzosek, 2018b; Kroese et al., 2014b; Ramzi & Saed, 2019). For instance, although they know they might regret it the next day, they choose to watch a movie or play video games and end up procrastinating going to bed. The study by Exelmans and Van den Bulck (2021) further supports this explanation as they found that lower self-control adults are more likely to give in to the temptations offered by television, which leads them to engage in bedtime procrastination.

According to Gillebaart (2018), self-control enables individuals to give up short-term immediate gratification for enormous long-term rewards. The short-term gratification can be referred to the pleasant feelings the individuals gain from scrolling their phones, playing video games or watching television before going to bed, whereas the long-term larger reward can be referred to waking up the next day early in the morning without feeling fatigued as a result of going to bed on time. Kroese et al. (2014a) stated that people procrastinate going to bed because it is difficult for them to quit their activities before bedtime. Often, these activities before bedtime offer short-term gratification to the individuals, leading them to engage in bedtime procrastination if they have lower self-control.

Despite the negative association between self-control and bedtime procrastination which is reported in several studies, another research by Kühnel et al. (2018) does not support the notion that a lack of self-control results in bedtime procrastination. Rather than viewing bedtime procrastination as a self-regulation problem, Kühnel and colleagues (2018) argued that chronotypes predict bedtime procrastination. Nevertheless, Kroese et al. (2018) made a

commentary on this claim by Kühnel et al. (2018). Kroese et al. (2018) concurred with Kühnel et al. (2018) that those with late chronotypes might have difficulties going to bed at the appropriate time according to societal requirements. However, this does not demonstrate that self-regulation is irrelevant to be included in the explanation of the bedtime procrastination phenomenon. Kroese et al. (2018) advocated research integrating findings from both chronotype and self-regulatory perspectives to advance the body of knowledge in this field. Thus, the current research studies both self-control and chronotype as predictors of bedtime procrastination.

Additionally, a number of past studies have indicated that self-control is a significant predictor of general procrastination (Przepiórka et al., 2019; Ramzi & Saed, 2019; Wijaya & Tori, 2018). Although these studies did not focus on the specific domain of procrastination, namely 'bedtime procrastination', the study by Kroese et al. (2014a) revealed that bedtime procrastination was also associated with general procrastination, which endorses its position as a form of procrastination. With self-control, people can handle their impulses and control their feelings to avoid unhealthy behaviour such as bedtime procrastination, and to reach the goal they want to achieve such as waking up early in the morning without feeling tired.

Overall, despite having one past study with inconsistent findings (Kühnel et al., 2018), the majority of the past studies found a significant negative relationship between self-control and bedtime procrastination (Exelmans & Van den Bulck, 2021; Geng et al., 2021; Kadzikowska-Wrzosek, 2018b; Mao et al., 2022). Thus, in this current study, it is hypothesised that self-control would negatively predict bedtime procrastination among Malaysian young adults.

## 2.6 Chronotype and Bedtime Procrastination

Several past research studies have found a significant relationship between chronotype and bedtime procrastination (Chung et al., 2020; Hairston & Shpitalni, 2016; Kadzikowska-Wrzosek, 2018a; Kühnel et al., 2018; Przepiórka, 2019). In a study conducted in Korea by Chung et al. (2020), it was discovered that young adults from the eveningness group reported higher scores on bedtime procrastination. They also reported that individuals with higher bedtime procrastination scores were more likely to sleep an additional 50 minutes on average and wake up an additional 46 minutes later than those with lower bedtime procrastination scores. These results are in line with the findings reported by Meng et al. (2021a) in which there is a negative relationship between Morningness-Eveningness Questionnaire (MEQ) scores and bedtime procrastination scores among Chinese university students in China. In other words, individuals with a lower MEQ score, indicating “eveningness” (i.e., lower chronotype scores indicate eveningness), have a higher bedtime procrastination score.

Besides that, a study conducted in Germany by Kühnel et al. (2018) discovered a difference in the magnitude of the relationship between chronotype and bedtime procrastination. The relationship was found to be stronger on earlier workweek days (e.g., Monday and Tuesday) than on later workweek days (e.g., Wednesday and Thursday; Kühnel et al., 2018). To put it simply, individuals from the eveningness group are more likely to procrastinate their bedtime on the earlier days of the week. The study explain that individuals reported higher levels of bedtime procrastination in days early in the workweek because they experienced social jetlag and face difficulties adjusting from their biologically preferred bedtime to the socially induced bedtime at the beginning of the workweeks, which led them to put off going to bed (Lavie, 2001; Roenneberg et al., 2012; Strogatz et al., 1987). As days

pass, individuals accumulate more sleep debt and their homeostatic sleep drive increases, which makes it easier for them to fall asleep and lessens the effects of social jetlag (Roenneberg et al., 2003). As a result, the relationship between chronotype and bedtime procrastination became weaker later in the week.

On the other hand, Hairston and Shpitalni (2016) study explained the relationship between chronotype and bedtime procrastination from a different perspective which is the psychological perspective. This study explains that there is a relationship between individual circadian preference and individual mental health and psychological characteristics. According to Adan et al. (2012), individuals from the morningness group are more stable, conscientious, and socially desirable, while those who are from the eveningness group are more curious-seeking and neurotic. With the combination of individual psychological characteristics, impaired self-control, and evening preference, individuals in turn experience difficulties with planning and delaying gratification, which in turn results in procrastination behaviour (Rabin et al., 2011).

Even though many studies have reported that individuals from the morningness group have lower level of bedtime procrastination while those from the eveningness group have higher level of bedtime procrastination, a study by Magalhães et al. (2020) among high school students in Portugal found an inconsistent result. The study found that morningness is negatively associated with bedtime procrastination, in line with other studies, however, it failed to identify a positive relationship between eveningness and bedtime procrastination.

In short, most of the past studies have found a significant negative relationship between chronotype and bedtime procrastination, with eveningness having a stronger association than morningness (Chung et al., 2020; Hairston & Shpitalni, 2016; Kadzikowska-Wrzosek, 2018a; Kühnel et al., 2018; Przepiorka, 2019). However, there is an inconsistent



finding reported by one study that the positive relationship between eveningness and bedtime procrastination (i.e., negative relationship between chronotype scores and bedtime procrastination) has failed to be identified (Magalhães et al., 2020). Thus, the present study hypothesises that chronotype negatively predicts bedtime procrastination.

## **2.7 Future Time Perspective and Bedtime Procrastination**

Past research examined the link between present and future time perspective and procrastination and found that procrastinators are negatively associated with future time perspective, with regard to their cognitive focus of time (Sirois, 2014). In particular, people who emphasise future outcomes with less regard for present pleasure (i.e., future time orientation) are less likely to procrastinate, as compared to those who focus more on present enjoyment (i.e., present-hedonistic time orientation) and less future-oriented thinking. Nevertheless, it is important to note that the researcher found a greater effect size of the association of procrastination with future time perspective than with present time perspective (Sirois, 2014). Among all dimensions of time perspective, future time perspective plays an important part in accounting for health-related behaviour, being a prominent predictor of bedtime procrastination (Meng et al., 2021a).

Particularly, past studies demonstrated a negative association between future time perspective and health risk behaviour (Baird et al., 2021; Murphy & Dockray, 2018). Socioemotional selectivity theory (SST) explains that people's subjective perceptions of time influence their behavioural choices and the pursuit of goals (Carstensen et al., 1999). When people view time as expansive, they are more likely to prioritise future-oriented goals; while those who view time as limited would place relatively higher values for goals that are emotionally meaningful but with short-term benefits (Lang & Carstensen, 2002). Recent studies have found that FTP negatively predicted bedtime procrastination (Chen et al., 2022;

Mao et al., 2022; Okay et al., 2022), in which future-oriented time perspective was predominantly found in those with bedtime procrastination (Meng et al., 2021a), particularly due to their likelihood to consider future goals, make plans, and commit to goal-oriented activities such as resisting bedtime procrastination that is detrimental to their long-term health and future outcomes.

Okay et al. (2022) conducted an online survey among university students in Turkey, to examine whether FTP predicts bedtime procrastination and the mediating effect of purpose in life. A significant prediction relationship was found, which was mediated by purpose in life. The authors explained that people who believe that they have much time left in life develop a purpose for the future and engage in activities that lead them to it. On the other hand, those who perceive their time as limited (i.e., low FTP) are less likely to make future plans but prefer to engage in activities that bring immediate emotional satisfaction, rather than wasting it on sleeping.

Besides, a study by Chen et al. (2022), investigating bedtime procrastination and its associated factors with a sample of nursing students from a medical college in China, suggested that higher FTP encourages the nursing students to be confident in using future time and to make productive plans for life aspects, including bedtime, thus avoiding bedtime procrastination.

Similarly, another study (Mao et al., 2022) recruiting students from middle school, high school, and college as participants, which was conducted in China, found that participants with higher FTP engaged in regular sleep to maintain health function as they had higher value for long-term beneficial goals. Hence, bedtime procrastination scores were lower for them as they make a better effort to go to bed on time.

According to Meng et al.'s (2021b) findings, the relationship between FTP and bedtime procrastination was found to be partially mediated by self-control, while there was also an independent predicting effect of FTP on bedtime procrastination. In addition, it is noteworthy that Meng et al. (2021a) discovered the role of FTP as a prominent predictor, among all other dimensions of time perspective (i.e., past and present), that negatively predicts bedtime procrastination.

To conclude, FTP was found to have a negative predictive effect on bedtime procrastination (Chen et al., 2022; Mao et al., 2022; Okay et al., 2022), where it was also demonstrated that lower levels of FTP were found in bedtime procrastinators (Meng et al., 2021a). The negative prediction relationship can also be explained by one's purpose in life (Okay et al., 2022) and self-control (Meng et al., 2021b).

## **2.8 Theoretical Framework**

### ***Temporal Self-Regulation Theory***

The Temporal Self-Regulation Theory (TST) by Hall and Fong (2007) is a theoretical framework that explains an individual's health behaviour. According to this theory, the observed behaviour of an individual is determined by three proximal factors: intention strength, behavioural prepotency, and self-regulatory capacity. In this present study, bedtime procrastination is viewed as the observed behaviour in TST. The Temporal Self-Regulation Theory (TST) by Hall and Fong (2007) assumes there are two main spheres that have an impact on the behaviour, which are 'motivational sphere' and 'ambient temporal contingencies'.

The ambient temporal contingencies can be referred to as the sphere of momentary influence, including environmental and situational cues and individual-level factors that

affect how a person acts in certain circumstances. This includes behavioural prepotency and self-regulatory capacity (Hall & Fong, 2007). Self-regulatory capacity refers to the person's cognitive ability to exert control over their own behaviour, feelings, and thoughts to prevent undesirable responses (Cameron & Webb, 2013; de Ridder et al., 2012). According to Miller and Cohen (2001), self-regulatory capacity comprises executive control resources. It is ascribed to the functioning of the prefrontal cortex and associated neural systems involved in the neurobiology of self-control (Miller & Cohen, 2001).

As the trait self-control is one of the main constructs and indicators of self-regulation (de Ridder et al., 2012; Kroese et al., 2014b), the current study views self-control as the self-regulatory capacity in TST. According to TST (Hall & Fong, 2007), self-regulatory capacity will influence the observed behaviour, which is viewed as bedtime procrastination in the present study. Having lower self-control implies that the individual would have lower capacity to regulate his or her behaviour, thoughts and feelings to avoid undesired tendencies and perform goal-directed behaviour such as going to bed at the right time. Thus, lower self-control would predict the behaviour of bedtime procrastination.

On the other hand, behavioural prepotency refers to the quantifiable value which reflects the frequency of past behaviours or habits of the individual. It can also be defined as the default response of the individual to the environmental cues. Behavioural prepotency is made up of two components which are the variety of situation-specific influences and a more consistent element that describe how likely people are to engage in a particular behaviour based on their past engagement in the behaviour (Hall & Fong, 2007). Individuals' behaviour turns out to be automated and requires less conscious and intentional effort to initiate when it is frequently performed in a certain context (Aarts & Dijksterhuis, 2000).

In the current study, chronotype is viewed as behavioural prepotency in TST, which explains that one's circadian rhythm influences their behaviour, particularly sleep behaviour (Solomon & Zeitzer, 2019). Circadian rhythm is the system that regulates an individual's sleep and wake timing; it has been found to be closely related to an individual's chronotype (Solomon & Zeitzer, 2019). Previous studies have shown that maintaining a strict schedule can "train" an individual's circadian rhythm. This can be seen in which individuals who are eveningness-oriented are still able to wake up early or in accordance with the socially imposed schedule on working days (Kühnel et al., 2018). Thus, individuals' behaviour can be influenced if they consistently adhere to a specific sleep and wake time schedule. For instance, if the individual could consistently adhere to the socially imposed time schedule of sleeping at 11 p.m. in order to get sufficient rest and wake up at 8 a.m. in the next morning in order to avoid from being late to work, they would be able to reduce their bedtime procrastination behaviour. Sleeping earlier would also become an automated behaviour after sometimes repeating the behaviour. This finding helps to explain the role of chronotype as behavioural prepotency in TST in which it shows that an individual's bedtime procrastination behaviour was determined by their chronotype.

Besides having the direct causal influences on the health behaviour, TST (Hall & Fong, 2007) posits that behavioural prepotency and self-regulatory capacity also act as the moderator for the intention-behaviour relationship. This means that intentions are theorised to have a prominent influence on the performance of the behaviour in the presence of higher self-regulatory capacity or weaker behavioural prepotency.

The motivational sphere describes conscious decision on behaviour intention (i.e., whether or not to perform a behaviour); which particularly involves the temporal valuations of positive and negative consequences of the behaviour (Hall & Fong, 2007). In other words,

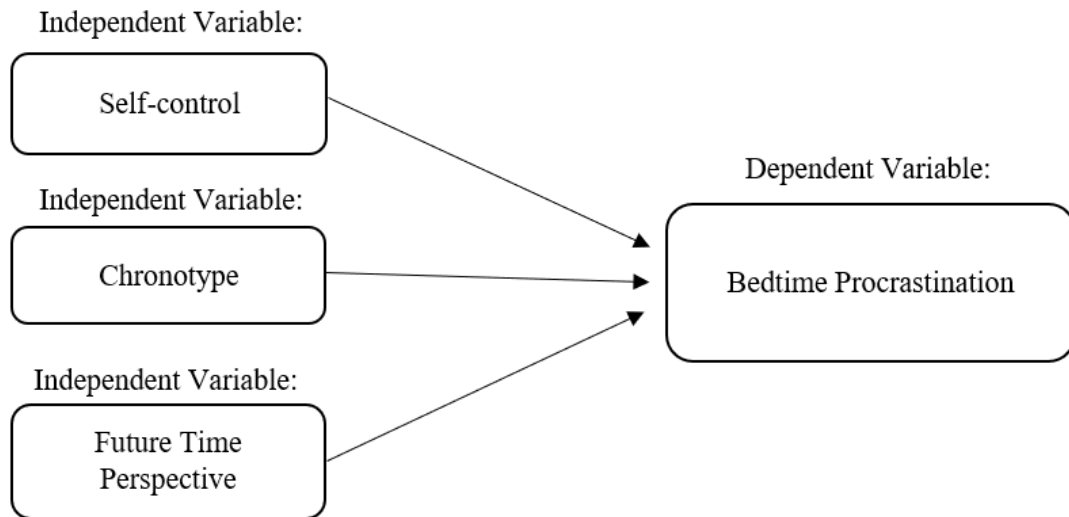
temporal valuation is the perceived temporal proximity of positive and negative consequences (i.e., how close in time the outcome will happen), which determines one's intention to perform or resist the behaviour (Hall & Fong, 2007). Individuals who focus on long-term contingencies and perceive positive consequences of behaviour as temporally closer than negative ones are more likely to resist health-risk behaviours (e.g., maintain a regular sleep time and hours); while those who focus on the short-term benefits are more likely to engage in health-risk behaviours (e.g., bedtime procrastination). Besides, the motivational sphere of TST (Hall & Fong, 2007) postulates that behavioural intention is a result of connectedness belief and temporal valuation. Simply put, how a person believes that current behaviour consistently leads to future outcome (connectedness belief), and how much value the person gives to the future outcome (temporal valuation; Mao et al., 2022), determine the person's intention to perform the current behaviour, then affect health-related behaviours (Hall & Fong, 2007).

In this study, FTP is viewed as the temporal valuation, with greater perceived value for the long-term positive outcome and temporal proximity. People with low FTP perceive a low temporal proximity of positive future consequences and/or low perceived value for future outcome, reducing temporal valuation which affects intention and behaviour to sleep on time. Thus, it is hypothesised that lower FTP reduces the intention to sleep on time and increases bedtime procrastination behaviour.

**2.9 Conceptual Framework**

*Figure 2.1*

*The Conceptual Framework of Present Study*



This study aims to examine self-control, chronotype, future time perspective (FTP), and bedtime procrastination among Malaysian young adults. Figure 2.1 shows the conceptual framework for this study, which involves self-control, chronotype, and future time perspective (FTP) as the predictors and bedtime procrastination as the dependent variable. Based on the Temporal Self-Regulation Theory (TST) by Hall and Fong (2007), this study takes self-control as the self-regulation capacity, chronotype as the behaviour prepotency, and FTP as the temporal valuation for the outcome behaviour, which is bedtime procrastination. Based on the literature review, it is hypothesised that self-control negatively predicts bedtime procrastination; chronotype negatively predicts bedtime procrastination; and FTP negatively predicts bedtime procrastination.

## **Chapter 3**

### **Methodology**

#### **3.1 Research Design**

The researchers implemented quantitative and cross-sectional research design to examine self-control, chronotype and future time perspective as the predictors of bedtime procrastination among young adults in Malaysia. Quantitative research involves collecting and analysing numerical data to describe or predict the study variables and the interested phenomenon (Gay et al., 2009). Quantitative research is carried out when the researchers aim to establish the relationships between the study variables to describe the current phenomenon (Mertler, 2016). In the present study, the phenomenon of interest is bedtime procrastination and the predictive variables are self-control, chronotype, and future time perspective. The current study analyses the numerical data collected to examine the relationships between the predictive variables and the outcome variable. Quantitative research is also less biased and more objective (Mertler, 2016). Thus, a quantitative method was chosen for the current study.

In the present study, cross-sectional research design is used, which can be carried out relatively faster and is cheap to conduct (Setia, 2016; Wang & Cheng, 2020). In this current study, the researchers administered surveys to the participants to investigate the relationships between the predictive and outcome variables. All data was collected from the participants once during the data collection period. Thus, it allows the researchers to collect data from a large sample within a short time. As cross-sectional study allows researchers to assess multiple variables at the same time (Thelle & Laake, 2015), it is appropriate for the current research which attempts to collect data on three independent variables (self-control, chronotype, future time perspective) and a dependent variable (bedtime procrastination) simultaneously.



## **3.2 Sampling Procedures**

### **3.2.1 Sampling Method**

Non-probability sampling method is used in the present study, which is a non-random method of selecting subjects from the target population based on the researchers' subjective judgement and convenience (Ayhan, 2011). Specifically, convenience sampling was used in this study. Convenience sampling is inexpensive, easy and time-saving, which gathers participants from the target population who are easily reachable, readily available, and willing to take part in the research (Etikan et al., 2016). With that said, one drawback of convenience sampling is the likelihood of the sample to be biased. Despite the limitation of generalisability due to bias of sample, convenience sampling that recruits a larger sample size may improve the generalisability of results (Emerson, 2021). In the present study, the researchers reached out to the potential participants, who are Malaysian young adults, through UTAR email and social media platforms. Brief information of the study, attached with the Qualtrics questionnaire web link, was sent to the participants. Besides, social media postings were made public on several platforms such as Instagram stories, Facebook posts, and Xiaohongshu posts, to reach more potential participants across the nation, in which their participation in this study was voluntary.

### **3.2.2 Location of Study**

The current study collected data through an online survey within Malaysia using the social media platforms, including Facebook, Instagram, WhatsApp, Wechat, and Xiaohongshu.

### **3.2.3 Ethical Clearance**

A research proposal for this study had been submitted to the Universiti Tunku Abdul Rahman's ethics review board for review and approval before the pilot study and actual study

being conducted in order to ensure that it is conducted in an ethical manner. The ethical approval letter was obtained on 10th of January 2023 with the code of U/SERC/02/2023 (see Appendix A).

### **3.3 Sample Size**

#### **3.3.1 *Sample Size***

The researchers of the current study used G\*Power software to calculate the suggested sample size for this study. By referring to the past studies relevant to the variables examined in this study, the effect size was calculated,  $f^2=0.17$ , and used to determine the minimum sample size suggested for this study, with the statistical power of 0.95, and the error probability of 0.05 (See Appendix B). The suggested sample size was 106. With consideration for the data cleaning process, the suggested sample size was increased by 30% to determine the final target sample size of 138, to ensure sufficient data collected. Finally, the total data collected from the Qualtrics questionnaire was 216. However, 108 invalid responses were filtered out during the data cleaning process, with a final sample size of 108 for further data analysis on SPSS.

#### **3.3.2 *Participants***

The target participants of this study are Malaysian young adults aged from 18 to 29 years old (Arnett, 2015), excluding those who have sleep disorders or work on-shift that they cannot voluntarily control their sleep time. Previous study demonstrated that about half of their young adult participants are classified under the high bedtime procrastination group (Chung et al., 2020). This finding is consistent with another study by Herzog-Krzywoszanska and Krzywoszanski (2019) which observed that higher Bedtime Procrastination Scale scores were reported among the younger participants. Based on the past studies, bedtime procrastination is prevalent among the young adults and is detrimental to their mental and

physical health (Chung et al., 2020; Guo et al., 2020; Kroese et al., 2016). Thus, this study aimed to examine the predictors of bedtime procrastination among Malaysian young adults.

### **3.4 Data Collection**

An online questionnaire created using Qualtrics was distributed to the target participants who are eligible for the study through UTAR email and several online platforms such as Instagram, Facebook, WhatsApp, Wechat, and Xiaohongshu, as far as reachable. A poster with the brief information regarding the research and the QR code to access the Qualtrics survey was created and posted on these online platforms to recruit participants for the study (see Appendix C). After analysing the pilot study, the data collection for the actual study was conducted for approximately four weeks, from 7 February 2023 to 27 February 2023. The inclusion criteria for this study were (1) young adults who are Malaysian and (2) aged between 18 through 29 years old. Meanwhile, the exclusion criteria are (1) people with sleep problems or disorders (e.g., insomnia, narcolepsy), or (2) shift workers, because these factors are beyond one's control that may have influenced their sleep time or duration (Kroese et al., 2014a).

Information regarding the study including the title of study, purpose of study, and eligibility of participation, were informed in the invitation text, with an attached link to the online survey questionnaire. Prior to answering the questionnaire, informed consent was presented to the respondent (see Appendix D), which ensures the confidentiality of data collected from the participants, anonymity of subjects, and that data collected will only be used for academic purposes. They were also informed about their rights to withdraw from the study at any time, either during or after the survey. They were to proceed to answering the questionnaire (See Appendix E) only after they agreed to the consent. Demographic information of the respondents such as age, gender, and ethnicity, were assessed. Next,

questions checking for the eligibility of participants were used to include only the responses that satisfied the inclusion criteria and did not meet the exclusion criteria, such as nationality, “Do you have any sleep problems or disorders (e.g., insomnia, narcolepsy)?” and “Are you working on a night shift or shift rotation?”, while those who fail to meet the criteria will be led to the end of the questionnaire.

### **3.5 Instruments**

#### **3.5.1 *Bedtime Procrastination Scale (BPS)***

The Bedtime Procrastination Scale (BPS) developed by Kroese et al. (2014) was the instrument used to measure the level of bedtime procrastination of respondents. The reliability of the scale in the original study was high, with Cronbach’s  $\alpha = 0.92$ . There are 9 items, using 5-point Likert scales ranging from 1 (*Almost never*), 2 (*Rarely*), 3 (*Sometimes*), 4 (*Frequently*), to 5 (*Almost always*), with items 2, 3, 7, and 9 as reverse items. The total scores of the scale range from 9 to 45, in which higher scores indicate higher levels of bedtime procrastination. For the current study, the reliability of the BPS was .859 in the pilot study and .852 in the actual study, which is considered a highly reliable scale.

Some examples of the items are “I go to bed early if I have to get up early in the morning”, “Often I am still doing other things when it is time to go to bed”, and “I easily get distracted by things when I actually would like to go to bed.”

#### **3.5.2 *Brief Self-Control Scale (BSCS)***

Brief Self-Control Scale (BSCS) developed by Tangney et al. (2004) is used to measure the level of the trait self-control of the young adults in the present study. The BSCS was highly reliable with Cronbach’s  $\alpha = .83$  and .85 in Studies 1 and 2, respectively reported in the original study (Tangney et al., 2004). Both studies were conducted among undergraduate students ranging in age from 18 to 55, and 18 to 49 respectively. Test-retest

reliability of BSCS as reported in the original study was .87. It is a 13-item scale using 5-point Likert scales ranging from 1 (*Not at all*), 2 (*Only a little*), 3 (*To some extent*), 4 (*Rather much*), to 5 (*Very much*). The reverse items include items 2, 3, 4, 5, 7, 9, 10, 12, 13. The total scores of the scale range from 13 to 65. Higher total scores indicate higher levels of self-control. For the current study, the reliability of the BSCS was .885 in the pilot study and .866 in the actual study, considered highly reliable.

Some examples of the items are “I am good at resisting temptation”, “I am able to work effectively toward long-term goals”, and “Sometimes I can’t stop myself from doing something, even if I know it is wrong”.

### **3.5.3 Morningness-Eveningness Questionnaire (MEQ)**

Morningness-Eveningness Questionnaire (MEQ) developed by Horne and Ostberg (1976) is used to measure an individual’s chronotype in this study. There are 19-items in the scale measuring two different factors, which are morningness and eveningness, through 4-Likert scales and time scales. Items 1, 2, 10, 11, 15, 17 and 18 are time scales while items 3 to 9, 12, 13, 14, 16, and 19 are 4-point likert scales. The total scores range between 16 to 86, a lower total score indicates more eveningness while a higher total score indicates more morningness (Horne & Ostberg, 1976). The scale has a high reliability as reported in the original study, with Cronbach’s  $\alpha = .82$  (Smith et al., 1989). For the current study, the reliability of the MEQ was .315 in the pilot study. Due to the low reliability, after examining the Cronbach’s alpha if the item is deleted, items 12, 14, and 16 were removed to improve the scale reliability in the actual study. This in turn results in a new total score that ranges from 13 to 74 and a good reliability of .700.

Some examples of the items are “What time would you get up if you were entirely free to plan your day?”, “How alert do you feel during the first half hour after you wake up in

the morning?”, and “At what time of day do you feel you become tired as a result of need for sleep?”.

### **3.5.4 *Zimbardo Time Perspective Inventory (ZTPI) Future Subscale***

The future subscale of Zimbardo Time Perspective Inventory (ZTPI) developed by Zimbardo and Boyd (1999) is used to measure the participants' future time perspective (FTP) in this study. The 13 items in the subscale are using 5-point Likert scales, which range from 1 (*Very uncharacteristic*), 2 (*Uncharacteristic*), 3 (*Neutral*), 4 (*Characteristic*), to 5 (*Very characteristic*). Item 9, 24, and 56 (Item 2, 7, 13 in this survey questionnaire for FTP) are reverse items. The scores of each item are summed up and then divided by 13. Higher scores indicate greater FTP. The reliability of the subscale reported in the original study was high, with an internal consistency of  $\alpha = .77$  and test-retest reliability of .80. For the current study, the reliability of the ZTPI future subscale was .766 in the pilot study and .660 in the actual study. The acceptable Cronbach's alpha value for the internal consistency of a scale is .60 (Creswell, 2012). Hence, the reliability of the ZTPI future subscale in the actual study is considered acceptable.

Some examples of the items are “When I want to achieve something, I set goals and consider specific means for reaching those goals”, “Meeting tomorrow's deadlines and doing other necessary work comes before tonight's play”, and “I take each day as it is rather than try to plan it out”.

### **3.6 Pilot Study**

The researchers of the present study conducted a pilot study to examine the feasibility of the research and to eliminate potential problems before the actual study. The data collection for the pilot study was started on 27 January 2023 until a sample size of 30

participants was recruited, which was suggested as sufficient for a pilot study (Browne, 1995). The internal consistencies of the instruments were examined using SPSS.

### **3.7 Data Analyses**

#### ***3.7.1 Data Cleaning***

This process focuses on recognising and removing errors and invalid data which will lead to uncertainties and inaccuracy in data analysis. The rationale of this process is to improve the quality of data by ensuring its accuracy and the adequate representation of the population (Ridzuan & Wan Zainon, 2019). Irrelevant data (i.e., responses that fail to fulfill the recruitment criteria) were filtered through the data collection process whereby the Qualtrics questionnaire was set to skip to the end of the survey for responses of which eligibility criteria was not met. In the data cleaning process, missing data, failed attention checking data and straightlining data were examined and eliminated before the data analysis phase. Missing data refers to the condition where the respondents failed to provide acceptable responses to one or more of the survey items; failed attention checking data refers to the data which the respondents did not answer according to the instruction given and straightlining data refers to the data where respondents provide identical or merely identical responses to a set of questions (Brick & Kalton, 1996; Kim et al., 2018).

#### ***3.7.2 Descriptive Statistics***

The descriptive statistics section consists of two subsections. The first subsection of the descriptive statistics is the demographic character in which a brief description and information about the participants, such as the age, gender, ethnicity, level of education, employment status, marital status and states that participants are living around were provided. The frequency, percentage, mean, and standard deviation of the information were presented

in a table. The second subsection is the descriptive statistics for variables. Similarly, the mean, standard deviation, overall minimum and maximum scores obtained by respondents for each variable were presented in this section.

### ***3.7.3 Normality Test***

There are 5 indicators used to test the assumptions of normality, including histogram and Quantile-Quantile Plot (Q-Q Plot) which are the graphical analyses, as well as skewness, kurtosis, and Kolmogorov-Smirnov (K-S) test which are the numerical analyses. Histogram is the frequency distribution which displays the distribution shape of the data, in which an approximately bell-shaped and asymmetrical distribution is considered normal (Marshall & Samuels, 2017). Q-Q Plot is the graphical presentation comparing the proportion of the sample's data to the quantiles of a normal distribution (Miot, 2017). The plots should fall approximately along the diagonal line to be considered as a normal distribution (Marshall & Samuels, 2017). According to Flatt and Jacobs (2019), skewness measures the extent and direction of how the probability distribution deviates from the normal distribution. Kurtosis is a measurement of the peakness of the probability distribution (Wijekularathna et al., 2019), where a positive value indicates a peakedness greater than normal (George & Mallery, 2021). For both skewness and kurtosis, a value within  $\pm 2$  is considered acceptable normality, closer to 0 indicates closer to normal (George & Mallery, 2021). The K-S test compares the cumulative distribution of scores with the expected distribution for a normal population (Hinton et al., 2004), where a normality is assumed when  $p > .05$  (i.e., null hypothesis is accepted; Mishra et al., 2019).

### ***3.7.4 Multiple Linear Regression (MLR)***

In the current study, Multiple Linear Regression (MLR) was used to test the hypotheses of the current study. The assumptions of MLR were examined, including



multivariate outliers and influential cases, multicollinearity, independence of errors, as well as the normality of residual, linearity, and homoscedasticity.

**Multivariate Outliers and Influential Cases.** Multivariate outliers are extreme data (i.e., extremely smaller or larger; Cousineau & Chartier, 2010) that can influence the parameters of the model, leading to biased results where the validity of the results may be jeopardised (El-Masri et al., 2021). Multivariate outliers that are influential need to be handled carefully (i.e., data deletion or transformation) before proceeding to the data analyses phase (El-Masri et al., 2021; Mowbray et al., 2018). Mahalanobis Distance (MD), Cook's Distance (CD), and Centered Leverage (CL) was used to analyse the cases to indicate whether the potential multivariate outliers are influential in the present study. Mahalanobis Distance (MD) is defined as the measurement of how far a case is apart from the distribution mean (Ghorbani, 2019). If the MD value of a case is greater than 15, it is considered a potential influential outlier (Barnett & Lewis, 1978). Cook's Distance (CD) measures any changes in the regression model parameters if a potential outlier is removed (El-Masri et al., 2021). A case with CD value greater than 1 is identified as an influential outlier (Cook & Weisberg, 1982). Centered Leverage (CL) measures the difference between the leverage value and the average leverage value which indicates how far a case is away from the majority of the other cases (El-Masri et al., 2021). Cases where the calculated CL values are greater than 3 times the leverage value of this study; leverage value is calculated using the formula  $(k+1)/n$ , are considered influential, where  $k$  is the number of predictors while  $n$  is the sample size of this study (Pituch & Stevens, 2015).

**Independence of Errors.** The residuals should be independent and uncorrelated with each other. In this current study, the researchers used the Durbin-Watson test to test the assumption of independence of errors. To meet this assumption, the acceptable range for the value of Durbin-Watson is 1 to 3 (Field, 2009).

**Normality of Residual, Linearity, and Homoscedasticity.** The residuals should be normally distributed. Besides that, it is important to examine the linearity. Linearity reflects the straight-line relationship of the predictors with the dependent variable. The true relationship will be misjudged if the relationship between predictors and the outcome variable is not linear (Osborne & Waters, 2002). Besides that, at each level of the predictors, the variance of the residual terms have to be constant to achieve the homoscedasticity (Field, 2009). According to Osborne and Waters (2002), there is no violation in normality of residual, linearity, and homoscedasticity if the distribution of scatterplots are random and even along the zero line. Scatterplot of standardised predicted value and standardised residual was generated to determine the three assumptions in this study.

**Multicollinearity.** Multicollinearity exists when the predictor in a regression model is strongly correlated with one or more of the other predictors, which poses a challenge to the examination of the distinct significance of each independent variable. (Field, 2009). The problem of multicollinearity must be avoided because multicollinearity could cause the deflation or inflation of the standard errors of the coefficients. Consequently, the coefficients could mistakenly turn out to be significant or nonsignificant, making the statistical inferences less reliable (Wooldridge, 2012). Tolerance and Variance Inflation Factor (VIF) were used to determine the correlation between the independent variables. According to Hair et al. (2010), no multicollinearity is found when the Tolerance value is greater than .10 and the VIF value is below 10.

## **Chapter 4**

### **Results**

#### **4.1 Data Cleaning**

Data cleaning is the identification and removal of problematic data, such as missing data, irrelevant data, and straight-lining data, in order to ensure the quality of the data. In the actual study, a total of 216 sets of responses were collected before the data cleaning process.

##### ***4.1.1 Input Error***

Several sets of responses recorded in the SPSS file downloaded from Qualtrics were chosen for cross-checking with the responses recorded in the Qualtrics. No input errors have been identified at this stage; thus, the total number of responses remains at 216.

##### ***4.1.2 Irrelevant Data***

There is no irrelevant data identified from the data sets because eligible checking was performed at the beginning of the survey, in which participants who did not fulfill the research's inclusion criteria were forced to stop answering the survey by the system. Therefore, this remains the total number of responses at 216.

##### ***4.1.3 Missing Data***

A total of 102 data sets were removed in this stage because participants dropped out in the middle of the survey, resulting in incomplete data sets. This contributes to a total of 114 data sets remaining.

##### ***4.1.4 Attention Checking***

One attention checking question was included in the middle of the survey to check on the participants' attention. The result from 6 data sets showed that the participants were not paying attention to the survey; thus, their responses were removed, resulting in a total of 108 responses.

#### ***4.1.5 Straight-lining Data***

In order to ensure the quality of the data, straight-lining data analysis was conducted to identify if there is any straight-lining data. No straight-lining data has been identified in this process, therefore, no data was deleted and the total number of responses remains at 108.

### **4.2 Normality Assumptions**

In the current study, five indicators were used to test the normality assumptions, including the graphical tests such as histogram and Quantile-Quantile Plot (Q-Q Plot; see Appendix G), as well as the numerical tests such as skewness, kurtosis, and Kolmogorov-Smirnov (K-S) test.

#### ***4.2.1 Histogram***

The histograms of bedtime procrastination, self-control, chronotype, and future time perspective showed approximately bell-shaped, indicating normal distributions for all the variables (see Appendix G).

#### ***4.2.2 Q-Q Plots***

Most of the observed Q-Q plots of the distributions for all the variables fall closely along the diagonal line (see Appendix G), indicating normal distributions.

#### ***4.2.3 Skewness and Kurtosis Values***

Table 4.1 shows the skewness and kurtosis values for each of the variables, with no violation of normality as they are within the acceptable range of  $\pm 2$ . Moreover, the values are within  $\pm 1$ , which indicate good normality for all the variables (George & Mallery, 2021).

**Table 4.1**

*Skewness and Kurtosis of variables*

Variables	Skewness	Kurtosis
Bedtime Procrastination	-.538	.046
Self-Control	.298	.049
Chronotype	.173	-.150
Future Time Perspective	.458	.889

**4.2.4 Kolmogorov-Smirnov (K-S) Test**

Table 4.2 shows the Kolmogorov-Smirnov (K-S) test values for all the variables. With  $p$ -value greater than .05, it indicates that the distribution is normal for self-control,  $D(108) = .065$ ,  $p = .200$ , and chronotype scores,  $D(108) = .077$ ,  $p = .118$ , while bedtime procrastination,  $D(108) = .095$ ,  $p = .017$ , and future time perspective,  $D(108) = .092$ ,  $p = .026$ , show violations of normality with significance values less than .05.

**Table 4.2**

*Kolmogorov-Smirnov's normality test*

Variables	Statistic	df	Sig.
Bedtime Procrastination	.095	108	.017
Self-Control	.065	108	.200*
Chronotype	.077	108	.118*
Future Time Perspective	.092	108	.026

**4.2.5 Summary**

Overall, the majority of the indicators, which are histogram, Q-Q plots, skewness, and kurtosis, showed no violation of normality for all the variables. However, the K-S test for bedtime procrastination and future time perspective indicated a violation of normality.

Overall, the normality assumptions for all the variables were considered as achieved, as the majority of the indicators including graphical (i.e., histogram and Q-Q Plot) and statistical interpretation (i.e., skewness, kurtosis, and K-S test), which were 4 out of 5 indicators for bedtime procrastination and future time perspective, and all 5 indicators for self-control and chronotype, showed no violation of normality (Mishra et al., 2019).

### **4.3 Outliers**

#### **4.3.1 Univariate Outliers**

A case that has an extreme value deviating from the estimated population values for a single variable is known as a univariate outlier (Tabachnick & Fidell, 2013). Eight outliers were identified using the boxplot (see Appendix J), where cases that fall outside of the boxplot whisker range were indicated as univariate outliers (Ghorbani, 2019). As they were not input errors nor did they significantly influence the normality assumptions or the results (Aguinis et al., 2013; Leys et al., 2019), the data were not removed.

#### **4.3.2 Multivariate Outliers**

A casewise analysis was used to detect potential multivariate outliers, in which 5 outliers that exceed 2 standard deviations were identified (see Table 4.3). Then, influential case diagnosis was conducted using Mahalanobis Distance (MD), Cook's Distance (CD), and Centered Leverage (CL; see Appendix K). The cases are considered influential if MD is more than 15 (Barnett & Lewis, 1978); MD for the cases were all smaller than 15. Any case with a CD greater than 1 indicates an influential case (Cook & Weisberg, 1982); all the cases showed CD values of less than 1. Cases where the calculated CL values are greater than 3 times the leverage value of this study (Pituch & Stevens, 2015), which is  $3[(3+1)/108] = 0.111$ , are considered as influential outliers. From the analysis, the CL values for the cases were within the acceptable range, except Case 50 and Case 106, which has a CL value of 0.118 and 0.131 respectively that exceeds the 3 times of leverage value. However, with two

out of three residual statistics meeting requirements, Case 50 and Case 106 were not removed.

**Table 4.3**

*Casewise Diagnostics for Bedtime Procrastination*

Case Number	Std. Residual	Bedtime Procrastination	Predicted Value	Residual
5	-2.535	16	29.75	-13.750
31	2.195	37	25.09	11.908
39	2.278	43	30.64	11.359
43	2.460	40	26.65	13.345
46	2.674	41	26.50	14.502

#### 4.4 Descriptive Statistic

##### 4.4.1 Demographic Characteristics

Table 4.4 presents the ages, genders, ethnicities, education levels, employment statuses, marital statuses and the states where the 108 participants reside. The average age range of 108 participants is 22.27 ( $M= 22.27, SD= 1.893$ ), ranging from 19 to 29 years old. The statistic shows that 57.4 percent ( $n = 62$ ) of the participants are female while 42.6 percent ( $n = 46$ ) are male. Majority of the participants are Chinese (71.3%), followed by Malay (42.6%), Indian (8.3%) and other ethnicities, such as Iban and Sikh (1.9%). Besides that, the result also shows that 79 out of 108 participants in this study are students, another 26 are employed and only 3 of them are unemployed. The current education level for most of the participants are undergraduate level (74.1%), followed by pre-university level (9.3%) and postgraduate level (6.5%) while 10.2% of the participants are not studying. Furthermore, the participants are mostly made up of 79.6% of single individuals ( $n = 86$ ) that are living around Perak (29.6%), Selangor (25%) and Penang (23.1%).

**Table 4.4**

*Descriptive Statistic of the Sample (n=108)*

Variables	<i>n</i>	<i>%</i>	<i>M</i>	<i>SD</i>
<b>Age</b>			22.27	1.893
19	5	4.6		
20	11	10.2		
21	13	12.0		
22	43	39.8		
23	19	17.6		
24	6	5.6		
25	5	4.6		
26	2	1.9		
28	2	1.9		
29	2	1.9		
<b>Gender</b>				
Male	46	42.6		
Female	62	57.4		
<b>Ethnicity</b>				
Malay	20	18.5		
Chinese	77	71.3		
Indian	9	8.3		
Other	2	1.9		
<b>Education Level</b>				
Pre-university	10	9.3		
Undergraduate	80	74.1		
Postgraduate	7	6.5		
Not Studying	11	10.2		



**Table 4.4 (Continued)**

*Descriptive Statistic of the Sample (n=108)*

Variables	<i>n</i>	%	<i>M</i>	<i>SD</i>
<b>Employment Status</b>				
Employed	26	24.1		
Unemployed	3	2.8		
Student	79	73.1		
<b>Marital Status</b>				
Single	86	79.6		
In a relationship	19	17.6		
Married	2	2.8		
<b>State of Residence</b>				
Perlis	5	4.6		
Kedah	7	6.5		
Penang	25	23.1		
Perak	32	29.6		
Selangor	27	25.0		
Negeri Sembilan	1	0.9		
Kelantan	1	0.9		
Johor	4	3.7		
Sarawak	6	5.6		

*Note.* *n* = Number of cases; % = Percentage; *M* = Mean; *SD*= Standard deviation.

#### **4.4.2 Descriptive Statistics**

Table 4.5 presents that mean and standard deviation of the three independent variables of the research which are self-control ( $M = 39.79$ ,  $SD = 8.472$ ), chronotype ( $M = 44.19$ ,  $SD = 6.139$ ), future-time perspective ( $M = 3.42$ ,  $SD = .449$ ). The results indicate that the

participants are more on the morningness type, they have moderately high bedtime procrastination and self-control while a slightly low future-time perspective.

**Table 4.5**

*Descriptive Statistic of Bedtime Procrastination, Self-Control, Chronotype and Future-Time Perspective*

Variables	<i>M</i>	<i>SD</i>
Bedtime Procrastination	30.45	6.394
Self-Control	39.79	8.472
Chronotype	44.19	6.139
Future-Time Perspective	3.42	0.449

*Note.* *M* = Mean; *SD*= Standard deviation.

#### **4.5 Assumptions of Multiple Linear Regression (MLR)**

##### **4.5.1 Independence of Errors**

In this current study, the researchers applied the Durbin-Watson test to test the assumption of independence of errors. In order to meet this assumption, the range for the value of Durbin-Watson has to be 1 to 3 (Field, 2009). Table 4.6 demonstrates the output of the Durbin-Watson test on the independence of errors among the three predictors (i.e., self-control, chronotype, future time perspective) in this present study. The results indicate no violation of this assumption as the Durbin-Watson value is 2.184. The value closer to 2 is congruent to the assumption, meaning that there is high independence and low correlation among the residuals.

**Table 4.6**

*Model Summary*

Model	<i>R</i>	<i>R</i> Squared	Adjusted <i>R</i> Square	Std. Error of the Estimate	Durbin- Watson
1	.548 <sup>a</sup>	.301	.280	5.424	2.184

a. Predictors: (Constant), Future Time Perspective, Chronotype, Self-control

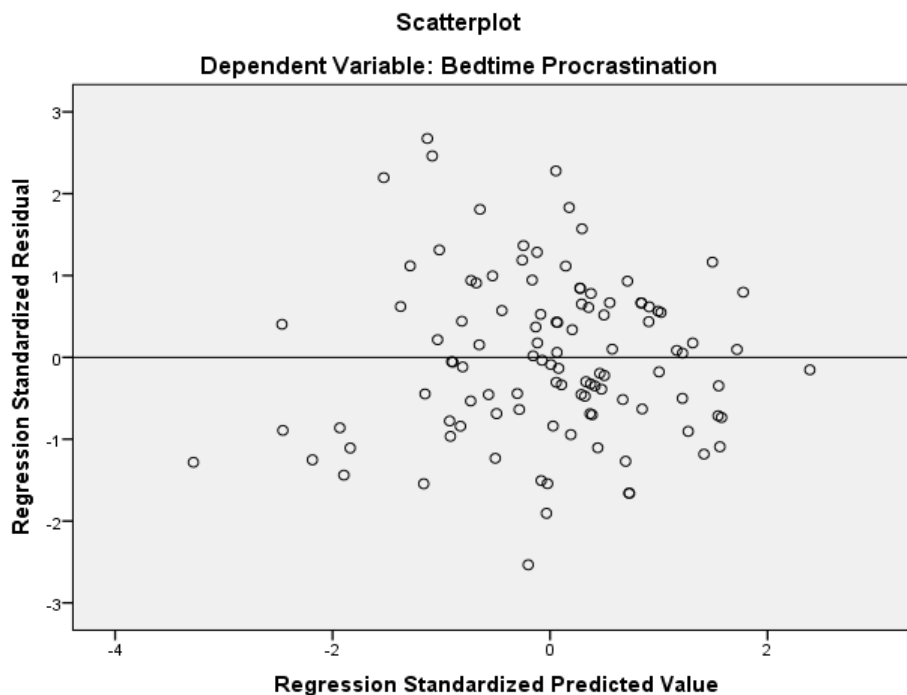
b. Dependent Variable: Bedtime Procrastination

**4.5.2 Normality of Residual, Linearity, and Homoscedasticity**

Figure 4.1 displays the scatterplot of the standardised predicted value of bedtime procrastination against the standardised residual. Based on the scatterplot, the residuals are evenly and randomly centralised and distributed in an oval shape along the zero line. This indicates that the three assumptions of normality of residual, linearity, and homoscedasticity are met.

**Figure 4.1**

*Scatterplot of Standardised Predicted Value and Standardised Residual*



**4.5.3 Multicollinearity**

The researchers used Tolerance and Variance Inflation Factor (VIF) to examine the correlation between the predictors in this study. Tolerance value above .10 and VIF value below 10 indicate that no multicollinearity is detected (Hair et al., 2010). Table 4.7 demonstrates the collinearity statistics of Tolerance and VIF which shows low inter-correlations between the independent variables as none of the values is lower or greater than the cut-off points. Hence, there is no multicollinearity found in this study.

**Table 4.7**

*Coefficients among Variables*

Variables	Collinearity Statistics	
	Tolerance	VIF
Self-control	.720	1.388
Chronotype	.950	1.053
Future Time Perspective	.701	1.427

**4.6 Multiple Linear Regression (MLR) Analysis**

Multiple Linear Regression analysis was run to examine the contribution of self-control, chronotype, and future time perspective on bedtime procrastination. Table 4.8 demonstrates that the model was statistically significant,  $F(3,104) = 14.897, p < .001$ , accounting for 28.0% of the variance (refer to Table 4.6 for Adjusted  $R^2$ ). As shown in Table 4.9, self-control ( $\beta = -.445, p < .001$ ) was found to be the significant negative predictor of bedtime procrastination among Malaysian young adults. Meanwhile, chronotype ( $\beta = .283, p = .001$ ) was also a significant predictor, but it positively predicts bedtime procrastination, which contradicts the direction of the hypothesis. Lastly, it was discovered that the future

time perspective ( $\beta = .025, p = .795$ ) is not a significant predictor of bedtime procrastination among Malaysian young adults.

**Table 4.8**

*ANOVA Table*

Model		Sum of Square	df	Mean Square	F	Sig.
1	Regression	1314.917	3	438.306	14.897	.000 <sup>b</sup>
	Residual	3059.851	104	29.422		
	Total	4374.769	107			

a. Dependent Variable: Bedtime Procrastination

b. Predictors: (Constant), Future Time Perspective, Chronotype, Self-control

**Table 4.9**

*Regression (Coefficients)*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	29.544	6.274		4.709	.000
	Self-control	-.336	.073	-.445	-4.602	.000
	Chronotype	.295	.088	.283	3.362	.001
	Future Time Perspective	.363	1.394	.025	.260	.795

#### 4.7 Summary of Findings

In sum, only one hypothesis is supported based on the results, that is, self-control negatively predicts bedtime procrastination among Malaysian young adults. The results of this present research do not support the other two proposed hypotheses.

**Table 4.10**

*Summary of Findings*

Hypotheses	Std. $\beta$	$p$	Decision
H <sub>1</sub> : Self-control negatively predicts bedtime procrastination among Malaysian young adults.	-.445	.000	Supported
H <sub>2</sub> : Chronotype negatively predicts bedtime procrastination among Malaysian young adults.	.283	.001	Not supported
H <sub>3</sub> : Future time perspective negatively predicts bedtime procrastination among Malaysian young adults.	.025	.795	Not supported

## Chapter 5

### Discussion

#### **5.1 H<sub>1</sub>: Self-control negatively predicts bedtime procrastination among Malaysian young adults.**

The present study's results support this hypothesis, indicating that self-control negatively predicts bedtime procrastination among Malaysian young adults. In other words, Malaysian young adults with lesser trait self-control are more prone to bedtime procrastination. In contrast, young adults with higher trait self-control are less inclined to engage in such behaviour. Supporting the findings of the previous studies (Bernecker & Job, 2020; Exelmans & Van den Bulck, 2021; Geng et al., 2021; Mao et al., 2022), this study replicated the negative link between self-control of the individual and bedtime procrastination. In addition, this finding is also congruent with a recent meta-analysis which provided evidence that bedtime procrastination is moderately associated with lower self-control (Hill et al., 2022).

The current study's findings further support the idea that young adults with lower self-control are generally less capable of resisting environmental distractions, temptations and stimuli. Rather than focusing on the longer-term goals and consequences of behaviour such as going to bed on time, they are more impulsive to the short-term gratifications offered by social or leisure evening activities such as playing video games, watching Netflix shows or scrolling phone (Hill et al., 2022; Kadzikowska-Wrzosek, 2018b; Kroese et al., 2014b; Ramzi & Saed, 2019). As a result, they engaged in bedtime procrastination. On the other hand, higher self-control young adults are less inclined to engage in bedtime procrastination because self-control enables them to put off immediate satisfactions offered by other stimuli

in favour of a more significant long-term benefit, such as waking up fresh and rested as a result of going to bed on time (Gillebaart, 2018).

The finding of this study is in accordance with the notion suggested by Kroese and colleagues (2018) that the self-regulation perspective plays a significant role in explaining the bedtime procrastination phenomenon. In congruence with the study by Bernecker and Job (2020), the current research concurs with the idea that bedtime procrastination is a prevalent phenomenon that can be conceptualised as a case of self-control failure. Therefore, the current study endorses the position of bedtime procrastination as a form of procrastination, which is defined as a self-regulatory failure that involves voluntarily delaying an intended action despite the adverse consequences of doing so (Klingsieck, 2013; Rozental & Carlbring, 2014). In this case, the transition from intention (i.e., intended to go to bed early and wake up rested) to behaviour aligned with that intention relies on the self-regulation skills (i.e., trait self-control) of the individual (Kadzikowska-Wrzosek, 2018b).

## **5.2 H<sub>2</sub>: Chronotype negatively predicts bedtime procrastination among Malaysian young adults.**

The result of this study indicated that chronotype significantly predicted bedtime procrastination, however, it does not support the hypothesis that chronotype negatively predicted bedtime procrastination; in fact, it showed that chronotype positively predicted bedtime procrastination. In other words, the result in this study shows that individuals who scored higher chronotype scores who are more likely the morning type tend to have a higher level of bedtime procrastination as compared to individuals who scored lower chronotype scores. This finding shows inconsistency with the findings from past studies (Kadzikowska-Wrzosek, 2018a; Lin & Chung et al., 2022; Taylor & Hasler, 2018). Even though the finding of this study is slightly inconsistent with past research, the finding that chronotype



significantly predicts bedtime procrastination is consistent with Hill et al., (2022) meta-analysis finding such that chronotype predicts bedtime procrastination.

This finding can be explained by the individual's depletion of self-regulatory resources in which individuals of the morningness type tend to procrastinate their bedtime at the end of the day as a way to restore their self-regulatory resources. According to Baumeister (2002), individuals' self-control tends to drop significantly to a lower point in the evening as people might have spent a lot of their self-regulatory resources in suppressing their desire in the morning of the day. For instance, they might have used their self-regulatory resources in suppressing their desire to play on their smartphones while at work in the morning, which left them to be unwilling or unable to use more of their self-regulatory capacity to get to bed. Thus, they will end up continuing doing something else at their preferred bedtime as it might work as a way to restore the resources through leisure or pleasure activities instead of sleeping (Hofmann et al., 2012a, 2012b).

In the modern industrial society, social structural demands have forced people to modify their waking hours which may disrupt their lifestyles and circadian rhythm (Hughes et al., 2022). Given that the sample of this study comprised students and working adults, their wake-up times may be uncontrollable, such that they have to wake up early in the morning in order to comply with the obligations for work and studies. Morningness was found to positively predict bedtime procrastination in the present study, which can be due to a lack of control over individuals' wake up times when people are forced to get up early because they have daily responsibilities; as a result, they tend to be expressed as morning people (Baehr et al., 2000). Regardless of their inability to control their wake times, they still have control over their sleep time, while the depletion of self-regulatory resources may be restored through night activities at their intended bedtime.

**5.3 H<sub>3</sub>: Future time perspective negatively predicts bedtime procrastination among Malaysian young adults.**

The findings did not support the third hypothesis of the present study, whereby the result showed a non-significant predictive relationship between future time perspective (FTP) and bedtime procrastination. This finding is inconsistent with previous research that found FTP as a significant predictor of bedtime procrastination with a negative relationship, such that people with a lower future time perspective have a higher tendency to engage in bedtime procrastination (Chen et al., 2022; Mao et al., 2022; Meng et al., 2021b; Okay et al., 2022).

A significantly smaller sample size would contribute to the insignificant result, in comparison to larger sample size in Okay et al. 's (2022) study ( $N = 317$ ), Meng et al.'s (2021b) study ( $N = 583$ ), and Chen et al.'s (2022) study ( $N = 1827$ ). Another plausible justification for the inconsistent result would be the variation in the sample of the current study, with broader age groups examined at the same time, involving not only students, but also working and non-working adults. The difference with past studies which recruited a large sample size while focusing on only students from middle school (Mao et al., 2022;  $N = 583$ ) to college (Chen et al., 2022;  $N = 1827$ ) and university (Okay et al., 2022;  $N = 317$ ) may explain the inconsistent finding.

Item 11 in the FTP scale in this study: "I am able to resist temptations when I know that there is work to be done", involves self-control that may interfere with FTP in explaining whether the intention of behaviour planned (i.e., to sleep on time) can be turned into actual behaviour. Self-control explains the relationship between FTP and bedtime procrastination (Meng et al. 2021b); hence, when low self-control contradicts the intention for future behaviour (i.e., self-control is low in future-oriented individuals), it diminishes the statistical power and significance of FTP as a predictor of bedtime procrastination.

While TST (Hall & Fong, 2007) explains that connectedness belief (i.e., an individual's belief about how his or her present behaviour consistently leads to future outcome) and temporal valuation (i.e., the value placed on the future outcome) influence his or her behavioural intentions at the present, Breig et al. (2020) suggested that one's excessive optimism about the future demands may give rise to dynamic inconsistency, which refers to the inconsistent temporal preference, resulting in contradicting behaviour selection at different time points with inconsistent time perspective (Gibbons, 2014). This dynamic inconsistency, also known as "time-inconsistent preferences" can complicate the relationship between time perspective and behavioural intention (Gaurav, 2021). For example, time-inconsistent people who have a future plan may not place enough value on the future outcomes to commit to the plans. They plan for future outcomes as if they were in the future-time, but their behaviour in the present may not accurately reflect the decisions they made, as if they believe that they are not going to stick with the plans (Gibbons, 2014).

A meta-analysis (Andre et al., 2018) suggested that FTP predicts individual behavioural intention and actual behaviour in different domains (i.e., education, work, and health), but its effect across these life domains is less significant. With that said, the scale includes items related to setting goals, achieving goals, and making plans, where the goals may have been perceived as academic-related plans and work-related plans, which may not necessarily be a significant driver of health-related intention and behaviour (e.g., getting sufficient sleep), reducing the significance of FTP as a predictor of bedtime procrastination. According to the same meta-analysis, the effects of FTP may vary across cultures due to cultural differences, helping us understand the inconsistent finding of the present study (i.e., FTP is not a significant predictor of bedtime procrastination) with the other studies that were not conducted in Southeast Asia (e.g., Chen et al., 2022; Mao et al., 2022; Okay et al., 2022).

Moreover, there is a high tendency that people engage in flow activities before bedtime, which makes them lose track of time (i.e., mindless bedtime procrastination; Nauts et al., 2018). For example, social media use is likely a flow experience that is characterised by total immersion and distorted perception of time (Brailovskaia et al., 2020; Kaur et al., 2016; Kwak et al., 2014). This time distortion is likely to alter the perception of the future when engaging in flow activities (Blom et al., 2021). In this case, future time perspective would be less of a significant determinant for sleeping later than the intended time (i.e., bedtime procrastination).

## **5.4 Implication**

### ***5.4.1 Theoretical Implication***

In this current study, the Temporal Self-Regulation Theory (TST) by Hall and Fong (2007) is used to explain the predictive effects of self-control, chronotype, and future time perspective on bedtime procrastination. Based on the results of the present study, self-control was found to be a significant negative predictor of bedtime procrastination among Malaysian young adults. This finding further consolidates the role of the self-control variable as the self-regulatory capacity in the TST (Hall & Fong, 2007) among Malaysian young adults. In line with the theory, this study indicated that self-regulatory capacity (i.e., self-control) plays a role in influencing the observed behaviour, which is regarded as bedtime procrastination in the current study, with lower self-control Malaysian young adults are more susceptible to bedtime procrastination because they have lower capacity to regulate their behaviour, thoughts and feelings to prevent undesired tendencies.

Besides that, the current study found that chronotype positively predicts bedtime procrastination among Malaysian young adults, which contradicts the hypothesis of this study. Nevertheless, the positive association between chronotype and bedtime procrastination

does not deny the relevance of TST in explaining the relationship between chronotype as the behavioural prepotency and bedtime procrastination as the observed behaviour in the TST.

As a significant predictor of bedtime procrastination, chronotype plays a role as the behavioural prepotency that influence individuals to engage in a particular behaviour which they engaged in the past, such that morningness-type people engage in bedtime procrastination behaviour as a diurnal cycle routine of previous constantly engaging in bedtime procrastination behaviour.

Future time perspective was found to be non-significant in predicting bedtime procrastination, which does not support the Temporal Self-Regulation Theory (TST) proposed by Hall and Fong, 2007. The dynamic inconsistency, which may be a result of excessive optimism about the future can complicate the relationship between time perspective and behavioural intention (Gaurav, 2021), reducing the statistical power and significance of FTP in predicting bedtime procrastination.

The previous studies related to this topic were all carried out in the overseas context such as Korea (Chung et al., 2020), Belgium (Exelmans & Van den Bulck, 2021), and Turkey (Okay et al., 2022). Considering the possible differences regarding sleep patterns across different countries, the current research fills in the knowledge gaps in research for the local literature by studying self-control, chronotype, and future time perspective as the predictors of bedtime procrastination among Malaysian young adults. Based on the results of this study, self-control and chronotype are found to be the significant negative and positive predictors among Malaysian young adults, respectively, whereas future time perspective was found as a non-significant predictor of bedtime procrastination among Malaysian young adults. These findings can serve as a baseline for future local researchers to study similar topics in this area, to consolidate further the findings of the present study in the Malaysian context, or further

examine the possible reasons behind the insignificance of FTP as a predictor of bedtime procrastination, and the role of self-control and chronotype in predicting bedtime procrastination among Malaysians.

#### ***5.4.2 Practical Implication***

Touching upon practical implications, the present research could raise awareness of the bedtime procrastination issue among young adults and the general public in Malaysia as this phenomenon may still not be notable to Malaysians. Malaysians may engage in bedtime procrastination as their regular night-time routine without conceptualising this behaviour. Considering the adverse outcomes of bedtime procrastination such as sleep deficiency, daytime fatigue and poorer sleep quality, this study could attract the attention of the Malaysians to the examined predictors of bedtime procrastination associated with the individual differences.

Besides that, consolidating self-control as the predictor of bedtime procrastination serves as a stepping stone towards developing and modifying intervention programmes that could reduce bedtime procrastination by teaching self-regulatory strategies to improve the self-control of the Malaysian young adults. For instance, the mental contrasting with implementation intentions (MCII), which is an online self-regulation exercise, has been found to be effective in increasing commitment to reduce bedtime procrastination (Valshtein et al., 2020). However, more studies may be carried out to study the effectiveness of such programmes in the local context. Besides that, among young adults who are students, local academic institutions could organise workshops that equip them with self-regulatory strategies to improve their self-control. At the same time, in the local workplace setting, companies could give self-control training to help young adult employees overcome the undesirable behaviour of bedtime procrastination.

### 5.5 Limitations

Several limitations need to be addressed in this current study. Firstly, this study has a low sample size. Initially, the number of responses received for the study was 216 in total; however, after data cleaning (i.e., removing incomplete responses and responses that did not pass the attention-checking question), the total number of completed responses was only 108, which means nearly half of the participants did not complete the questionnaire. The lengthy survey may have led to the high abandonment rate (Sharma, 2022). According to Sharma (2022), keeping the survey within 30 questions is preferable to maintain the respondents' interest and attention. However, the questionnaire administered in the current study has exceeded 30 items, with the lengthiest instrument being the MEQ scale (Horne & Ostberg, 1976) which consists of 16 items in this study. It is possible that the lengthy survey may cause survey fatigue among the participants which may be the cause of small sample size in this study. As low sample size might affect the generalisability of the findings, the findings of this study have to be interpreted with caution.

Besides that, another limitation is that the levels of bedtime procrastination during the weekdays and weekend were not examined separately in the current study as the data were collected at one time cross-sectionally. It is possible that the level of bedtime procrastination could slightly change over the course of the week as demonstrated in the past study (Kühnel et al., 2018) where some participants reported more bedtime procrastination during the workdays. Furthermore, cross-sectionally, this study might not be able to capture well the level of bedtime procrastination throughout the week among the participants as the participants might answer the survey based on their intended bedtime on the specific day. Hence, the findings of the present research should be interpreted cautiously.

Considering that Malaysia is a multi-ethnic country, having a sample with an unproportionate ratio of ethnic groups could be a limitation in this study. Most of the participants in this study were Chinese, making up 71.3% of the participants, followed by Malays (18.5%), Indians (8.3%), and others (1.9%). Due to the unproportionate ratio of ethnicities, the findings of this study may not be generalisable well to other ethnic groups in Malaysia.

Another methodological limitation is, the unidimensionality of the ZTPI future subscale (Zimbardo & Boyd, 1999) used in this study, despite being well-validated across various countries, may have neglected components of FTP such as affect, cognition, and behavioural intention (Andre et al., 2018), as well as the ability to identify domain-related FTP which varies across individuals (e.g., one's FTP for health-related outcomes would be low despite the high FTP for work- and academic-related outcomes; Andre et al., 2018; Murphy et al., 2020); given that the available multidimensional FTP scales are with little to no evidence of psychometric properties in the Malaysian context (Brothers et al., 2014) and the young adult context (i.e., old adults, Kozik et al., 2019).

## **5.6 Recommendations**

There are several recommendations for future researchers to conduct similar studies to advance the body of knowledge on this topic. Firstly, future researchers are recommended to use longitudinal research design to explore more comprehensively on the relationship between the variables, which allows researchers to identify whether there are changes in the dependent variable (i.e., bedtime procrastination) when there are changes in independent variables (i.e., self-control, chronotype, and FTP) over a longer period of time (Caruana et al., 2015). For instance, considering the possible changes in the level of bedtime procrastination over the span of the week as reported in the past study (Kühnel et al., 2018), future



longitudinal studies could assess the data collected from the participants differentially across weekdays and weekends.

Besides that, future research with a larger sample size is needed to examine further and confirm the findings of this study. Considering the variation in the sample in the present study, future studies shall focus their target population on the students or working adults' group to generate more conclusive results. The findings that FTP as a non-significant predictor and the low variance of this model in explaining bedtime procrastination call for future studies to discover other relevant variables and add more potential variables in predicting bedtime procrastination to improve the model.

Furthermore, as the current study was only conducted on the Malaysian young adults aged between 18 to 29, the future researchers could study the similar topic among Malaysians with different age groups, such as adolescents pursuing secondary school education. Besides studying the phenomenon of bedtime procrastination among young adults who are either university students or young working employees, it is important to study this undesirable sleeping behaviour among secondary school students who are still going through their puberty stage considering the negative impacts such as sleep deprivation on health and performance brought by bedtime procrastination (Chung et al., 2020; Diekelmann & Born, 2010; Guo et al., 2020).

In order to reduce the possible disadvantages brought by the lengthy survey, future researchers can employ a reliable and shorter scale with lesser items that contain more concise statements to assess the chronotype variable, which might be able to reduce the abandonment rate as well as survey fatigue among the participants. Given that there are very limited instruments measuring chronotype being validated in Malaysia, future researchers could develop or modify a well-validated shorter scale for the local context based on the

currently available measures. Future researchers are also recommended to develop and validate a more comprehensive multidimensional scale to expand the understanding of FTP.

In addition, rather than subjective and retrospective self-report questionnaires that might detract (i.e., underestimate or overestimate; Mazza et al., 2020) the accuracy of response, researchers can use more objective measures (e.g., measuring motor activity, cortisol levels, or skin temperature) in measuring chronotype, such as using ambulatory circadian monitoring (ACM) sensors (Martinez-Nicolas et al., 2019; Ortiz-Tudela et al., 2010) or actigraph (Gershon et al., 2017; Schneider et al., 2021); as well as a more detailed measure to assess bedtime procrastination, such as the sleep diary to record intended and actual bedtime every night (Mazza et al., 2020).

## **5.7 Conclusion**

To conclude, this study examined the predictor roles of self-control, chronotype, and future time perspective on bedtime procrastination among Malaysian young adults. The result supports the first hypothesis that self-control is a significant negative predictor of bedtime procrastination among Malaysian young adults. This finding indicates that Malaysian young adults with lower self-control are more prone to bedtime procrastination, because they have a lower capability to resist environmental distractions and stimuli that hinder them from going to bed on time. Moreover, chronotype was discovered to be a significant predictor of bedtime procrastination with a positive direction, indicating that people who are more towards the morningness type tend to have higher levels of bedtime procrastination, which is inconsistent with the second hypothesis of this study. The third hypothesis of this study was also not supported by the finding that FTP is not a significant predictor of bedtime procrastination.

The current research has shed some light on the concept of bedtime procrastination in Malaysia, raising awareness regarding the phenomenon among young Malaysian adults. This

research has filled in the literature gaps in the Malaysian context by studying self-control, chronotype and future time perspective as the predictors of bedtime procrastination among Malaysian young adults. As self-control was found to predict bedtime procrastination negatively, future researchers could investigate the possible self-regulatory strategies for assisting Malaysian young adults to go to bed at their intended time. The finding of this study also calls for practitioners, academic institutions, and companies to develop or improve intervention programmes and training that involve self-regulatory strategies for Malaysian young adults to reduce bedtime procrastination.

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## Appendices

### Appendix A: Ethical Approval For Research Project/Protocol



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

Re: U/SERC/02/2023

10 January 2023

Dr Pung Pit Wan  
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 Pung,

#### 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 UAPZ3013/UAPZ3023. 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.	Personality Traits and Masculinity as Predictors of Homophobia Among Malaysian Young Man	1. Chiew Yee Kuan 2. Esther Ching Qian Han 3. Ling Chui Hong	Dr Chie Qiu Ting	10 January 2023 – 9 January 2024
2.	Social Media Use and Self-esteem as Predictors of the Risk of Experimentation with e-cigarettes Among University Students in Malaysia: Peer Influence as Mediator	1. The Xin Rou 2. Tam Jing Yi Evelyn 3. Yap Xue Li		
3.	"The Soft Things That We Hold Onto" – A Study on the Association Between Attachment Styles, Presence of Transitional Objects and Psychological Security Among Malaysian Young Adults	1. Poon Ying Ying 2. Chow Yu Ying 3. Sam Hei Man		
4.	The Predicting Effects of Attitudes, Subjective Norms, Perceived Behavioral Control on the Intention Towards Food Waste Reduction Behavior Among Malaysian Young Adults	1. Chan Hooi Mui 2. Shirley Lok Xiao Rui 3. Tee Hui Lin	Dr Gan Su Wan	
5.	Parent-Child Relationship, Perceived Social Support, and Perceived Discrimination as Predictors of Well-Being Among LGBTQ Emerging Adults in Malaysia	1. Haw Ying Huei 2. Lee Nie 3. Yashnevathy a/p Govindasamy		
6.	Personal Growth Initiative, Self-efficacy and Social Support as Predictors of Life Satisfaction Among Undergraduate Students in Malaysia	1. Diu Jia Suan 2. Chow Wen Chung 3. Tneh Sin Lin		
7.	Self-esteem, Locus of Control and Hopelessness as Predictors of Depression Among University Students in Malaysia	1. Cheang Yen Thung 2. Chuah Yue Xuan 3. Kelvin Goh Wei Jin	Dr T'ng Soo Ting	

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No	Research Title	Student's Name	Supervisor's Name	Approval Validity
8.	Personality Traits and Masculinity as Predictors of Homophobia Among Malaysian Young Man	1. Chiew Yee Kuan 2. Esther Ching Qian Han 3. Ling Chui Hong	Dr Chie Qiu Ting	10 January 2023 – 9 January 2024
9.	Determinants of Psychological Well-being Among Single Young Adults in Malaysia: Attitudes Towards Singlehood, Stereotypes and Social Support	1. Kan Vivian 2. Ngo Da Long 3. Wong Jia Man	Dr Nurul Iman Binti Abdul Jalil	
10.	Self-control, Chronotype, and Future Time Perspective as Predictors of Bedtime Procrastination Among Malaysian Young Adults	1. Isaac Lai Lik Jun 2. Leong Syn Jieh 3. Tan Hor Yinn	Dr Nurul Iman Binti Abdul Jalil	
11.	Perceived Stress, Resilience, Self-esteem as Predictors of Life Satisfaction Among University Students in Malaysia	1. Chueh Di-An 2. Hen Cavin 3. Lim Ya Xuan	Dr Nurul Iman Binti Abdul Jalil	
12.	The Relationship Between Smartphone Addiction, Internet Gaming Disorder (IGD), and Sleeping Problem (Insomnia) Among Young Undergraduate Students in Malaysia	1. Leong Lerk Yung 2. Liew Yee Hang 3. Shin Bin Shyen	Dr Ooh Seow Ling	
13.	Pornography Use, Body Image, and Relationship Satisfaction Among Malaysian Young Adults	1. Shin Bin Shyen 2. Hen Zi Wei 3. Teeba Suriya a/p Kumar	Dr Ooh Seow Ling	
14.	Anxiety, Social Support and the Association with Psychological Well-Being Among Undergraduate Students	1. Sherine Divya a/p Pубalan 2. Nisa a/p Jothi	Dr Ooh Seow Ling	
15.	Loneliness and Perceived Social Support as the Predictor of Internet Addiction Among Undergraduates in Malaysia	1. Tan Jia Chyi 2. Tan Tong Yen 3. Vong Yang Yi	Dr Pung Pit Wan	
16.	Depression and Self-efficacy as Predictor to Academic Procrastination Among Undergraduate Students in Malaysia	1. Ricken Chung Li Ken 2. Tay Chong Leng 3. Joel Lee Xin Wei	Dr Pung Pit Wan	
17.	Parenting Style as Predictors of Prosocial Behaviours Among Undergraduates in Malaysia	1. Wendy Tan Syn Yao 2. Liong Chu Lam	Dr Pung Pit Wan	
18.	Relationship Among Self-control, Grit and Academic Procrastination Among Undergraduates in Malaysia	1. Cheow Pui Kei 2. Lim Jo Yee 3. Yap Yee Qi	Dr Siah Poh Chua	
19.	Dark Triad Personality and Moral Disengagement as the Predictors of Cyberbullying Among Undergraduate Students in Malaysia	1. Li Xin Yan 2. Hew Hui Teng 3. Loh Shao Heng	Dr Siah Poh Chua	
20.	The Relationship Between Self-control, Coping Strategy and Online Game Addiction Among Undergraduate Students in Malaysia	1. Lim Chia Huey 2. Lim Shu Yee 3. Tan Shi Wei	Dr Siah Poh Chua	
21.	Does Being Angry Dismiss Me from Moral Norm-keeping? An Experimental Study on the Mediating Relationship of Moral Disengagement on Anger and Cyberbullying Intention	1. Chen Win Chuan 2. Tanreet Kaur a/p Suakwinder Singh 3. Wong Puy Lyng	Dr Tan Chee Seng	
22.	The Relationship Between Autonomy, Subjective Socioeconomic Status, and Exposure to Alternative Partners on Social Media and Attitude Towards Singlehood Among Adults in Malaysia	1. Chong Yoke Sun 2. Denisha a/p Vislnasan 3. Lahvaanya a/p Pannir Selvem	Dr Tan Chee Seng	
23.	Intimate Partner Violence and Psychological Distress Among Couples in Malaysia: The Role of Stockholm Syndrome	1. Samantha Ng Hui Li 2. Juliana Hoo Ju Yun	Mr Tan Soon Aun	
24.	The Mediating Role of Stress Between the Relationship of Perfectionism & Mental Well Being Among Undergraduates in Malaysia	1. Remukaa a/p Siva Kumar 2. Shabeena Yohanes a/p Stevenraj 3. Yugesh a/p Santara Sheeran	Mr Tan Soon Aun	
25.	The Relationship Between Mental Health Literacy, Help-seeking Behaviour, and Socioeconomic Status Among Young Adults in Malaysia	1. Ang Yu Lun 2. Ch'ng Wei Sheng 3. Chua Leewen	Mr Tay Kok Wai	

No	Research Title	Student's Name	Supervisor's Name	Approval Validity
26.	Sex Addiction is Associated with Personality, Social Circles, and Mental Health Issues	1. Loke Win Yi 2. Ng Zhen Le 3. Tey Cre Ying	Mr Tay Kok Wai	10 January 2023 – 9 January 2024
27.	The Relationship Between Body Mass Index (BMI), Social Media Intensity and Body Image on Anxiety Among Youths in Malaysia	1. Angelina Gin Ger Ong 2. Kumetni a/p Gobi 3. Shirley Jesslyna a/p Jayaseelan		
28.	Family Functioning, Childhood Trauma, and Self-esteem as the Predictors of Social Anxiety Among Malaysian University Students	1. Jivithan a/l Sasidaran 2. Merlena Ann Mariasoosai 3. Sela a/p Sobin Mondal		
29.	Relationship Between Vocal Fatigue, Emotion, and Motivation with Mask-wearing Among Kampar UTAR Educators	1. Celine Tan Si Min 2. Chong Yueen Cheng 3. Loo Xin Yan	Ms Lee Wan Ying	
30.	The Relationship Between Gender Role Attitudes, Attitudes Toward Childbearing, Family Functioning and Attitudes Toward Marriage Among Young Adults in Malaysia	1. Choo May Yan 2. Chloe Ng Chu Yin 3. Claryce Cheong Yong Qing		
31.	A Study on Materialism, Anxiety and Gender Differences in Compulsive Buying Behaviors Among Young Adults in Malaysia	1. Lim Shi Yuan 2. Lim Yit Han 3. Loh Carmen		
32.	Post-traumatic Stress Disorder (PTSD) as The Predictor of Emotional Well-being and Resilience Among Undergraduate Students During the COVID-19 Outbreak	1. Darshinee a/p Arudkanth 2. Divya Tharshini a/p Puantharan 3. Nivethah a/p Kalaiyarasan	Ms Liza Hartini Binti Rusdi	
33.	The Relationship Between Living Standard and Mental Health Literacy Among Youth in Malaysia	1. Su Kailun 2. Chew Weng Kit 3. Vinmosha a/p K Jeyaseelan		
34.	Relationship Between Loneliness, Self-esteem and Binge Eating Among Undergraduates in Malaysia	1. Ong Ting Wei 2. Ng Chien Yi 3. Lim Wei Fang	Ms Sanggari a/p Krishnan	
35.	The Influence of Job Stress and Resilience on Job Satisfaction Mediated by Work-life Balance Among Lecturers in Universiti Tunku Abdul Rahman	1. Lee Jun Kang 2. Foong Wei How 3. Luo Wen		
36.	Mindfulness, Resilience, and Work-Family Conflict Predict Job Performance Among Working Adults	1. Teoh Yi Wen 2. Cheah Jie Min 3. Lott Sin Yee	Ms Teoh Xi Yao	
37.	Compulsive Internet Use, Self-esteem, Self-efficacy as Predictors of Academic Procrastination Among Undergraduate Student	1. Lin Xingyi 2. Wong Xin Lynn 3. Zhan Shuwei		
38.	Relationship Between Self-esteem, Loneliness, Stress and Excessive Use of Social Media Among Undergraduate Students in Malaysia	1. Lee Hao Yan 2. Daniel Chow Weng Kin 3. Fong Zhen Yann	Pn Wirawahida Binti Kamarul Zaman	
39.	An Exploratory Study on the Impacts of Social Media on Malaysian Young Adults' Psychological Wellbeing	1. Rae Oon El Jin 2. Kelvin Lim Zhi Jian 3. Huang Jing Fei		
40.	A Case Study: Parenting Practices of Millennial Single Fathers and Its Effects on Children	1. Chua Ng Gie 2. Paige Chee Hui Min 3. Pearl Lee Yi Yao		

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

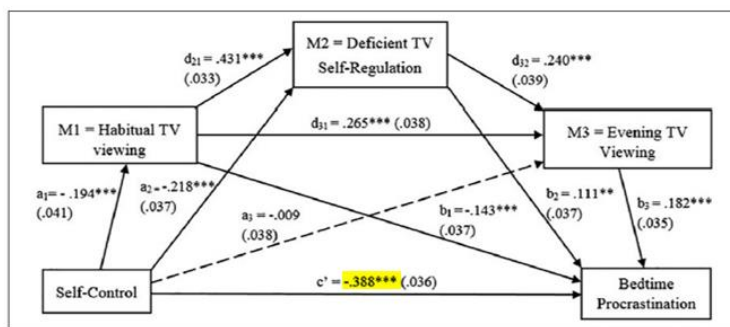
Appendix B: Sample Size Calculation

Self-Control

$$R(\text{Self-control}) = [(-.388)+(-.39)]/2 = -.389$$

$$r = -.388 \text{ (Exelmans \& Van den Bulck, 2021)}$$

Exelmans, L., & Van den Bulck, J. (2021). “Glued to the tube”: The interplay between self-control, evening television viewing, and bedtime procrastination. *Communication Research*, 48(4), 594–616. <https://doi.org/10.1177/0093650216686877>



**Figure 1.** Serial multiple mediation model of self-control on bedtime procrastination with habitual TV viewing, deficient TV self-regulation, and evening TV viewing as mediators. Note. Analyses are based on 5,000 bootstrap samples, controlling for gender, age, educational level, shiftwork, clinical history of sleep problems, and self-perceived physical health status. Path coefficients are standardized estimates with standard errors reported in parentheses. →significant path; ----→non-significant path. Effect sizes ( $\Delta R^2$ ) for individual paths:  $a_1 = .029, p < .001$ ;  $a_2 = .032, p < .001$ ;  $a_3 = .001, p = .468$ ;  $d_{21} = .30, p < .001$ ;  $d_{32} = .014, p < .001$ ;  $d_{31} = .065, p < .001$ ;  $b_1 = .036, p < .001$ ;  $b_2 = .022, p < .001$ ;  $b_3 = .033, p < .001$ ;  $c' = .096, p < .001$ . Total indirect effect c: effect size =  $-.030$ , Boot SE =  $.014$ , 95% CI =  $[-.058, -.003]$ . Indirect effect ( $a_1b_1$ ) through M1: effect size =  $.028$ , Boot SE =  $.009$ , 95% CI =  $[.012, .051]$ . Indirect effect ( $a_2b_2$ ) through M2: effect size =  $-.024$ , Boot SE =  $.009$ , 95% CI =  $[-.045, -.009]$ . Indirect effect ( $a_3b_3$ ) through M3: effect size =  $-.002$ , Boot SE =  $.008$ , 95% CI =  $[-.018, .013]$ . Indirect effect ( $a_1d_{21}b_2$ ) through M1 and M2: effect size =  $-.009$ , Boot SE =  $.004$ , 95% CI =  $[-.018, -.003]$ . Indirect effect ( $a_1d_{31}b_3$ ) through M1 and M3: effect size =  $-.009$ , Boot SE =  $.003$ , 95% CI =  $[-.018, -.004]$ . Indirect effect ( $a_2d_{32}b_3$ ) through M2 and M3: effect size =  $-.010$ , Boot SE =  $.003$ , 95% CI =  $[-.018, -.005]$ . Indirect effect ( $a_1d_{21}d_{32}b_3$ ) through M1, M2, and M3: effect size =  $-.004$ , Boot SE =  $.001$ , 95% CI =  $[-.007, -.002]$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

$$r = -.39 \text{ (Kroese et al., 2014b)}$$

Kroese, F. M., Evers, C., Adriaanse, M. A., & de Ridder, D. T. D. (2014b). Bedtime procrastination: A self-regulation perspective on sleep insufficiency in the general population. *Journal of Health Psychology*, 21(5), 853-862. <https://doi.org/10.1177/1359105314540014>

**Table 2.** Correlations.

	1	2	3	4	5	6	M (SD)
1. Bedtime procrastination	–						2.7 (0.8)
2. Self-control	-.39**	–					3.4 (0.6)
3. Insufficient sleep (days)	.49**	-.28**	–				2.1 (2.0)
4. Fatigue (days)	.28**	-.25**	.56**	–			1.9 (2.1)
5. Hours of sleep (baseline survey)	-.24**	.08**	-.35**	-.14**	–		7.2 (1.3)
6. Hours of sleep (diary)	-.17**	.05*	-.30**	-.10**	.49**	–	7.4 (1.0)
7. Satisfaction w/hours of sleep	-.43**	.25**	-.66**	-.43**	.43**	.32**	3.6 (1.1)

\* $p < .05$ ; \*\* $p < .001$ .

**Chronotype**

$$R(\text{Chronotype}) = [(-.41) + (-.39)]/2 = -.40$$

$r = -.41$  (Kadzikowska-Wrzosek, 2018b)

Kadzikowska-Wrzosek, R. (2018b). Self-regulation and bedtime procrastination: The role of self-regulation skills and chronotype. *Personality and Individual Differences, 128*, 10-15. <https://doi.org/10.1016/j.paid.2018.02.015>

**Table 3**  
Internal consistency reliability (Cronbach's  $\alpha$ ), means, standard deviations, and **intercorrelations** among all study variables.

	M	SD	M-E	ACS-90	Bedtime procrastination	Hours of sleep	Insufficient sleep	Fatigue	Gender	Age
M-E	33.64	7.13	(0.84)	0.16**	<b>-0.41**</b>	0.10	-0.31**	-0.26**	-0.14*	0.22**
ACS-90	11.69	4.85		(0.83)	-0.23**	0.03	-0.17**	-0.30**	0.05	0.09
Bedtime procrastination	3.19	0.84			(0.85)	-0.34**	0.44**	0.32**	-0.10	-0.02

Note: M-E = Morningness-Eveningness; ACS-90 = Action Control Scale. Diagonal values are the internal consistency estimates for each scale. Gender is coded 0 = female, 1 = male.

\*  $p < 0.05$ .

\*\*  $p < 0.01$  (all two-tailed significance tests).

$r = -.39$  (Kadzikowska-Wrzosek, 2018a)

Kadzikowska-Wrzosek, R. (2018a). Insufficient sleep among adolescents: the role of bedtime procrastination, chronotype and autonomous vs. controlled motivational regulations. *Current Psychology, 39*, 1031-1040. <https://doi.org/10.1007/s12144-018-9825-7>

**Table 4** Means, standard deviations and Spearman's rank-order intercorrelations ( $r_s$ ) among all study variables

	M	SD	M-E	RAI	Bedtime procrastination	Hours of sleep	Insufficient sleep	Fatigue	Gender	Age
M-E	29.39	5.72		0.18*	<b>-0.39**</b>	0.05	-0.48**	-0.40**	-0.02	-0.02
RAI	5.44	2.08			-0.37**	0.31**	-0.29**	-0.11	0.05	0.09
Bedtime procrastination	3.34	0.81				-0.42**	0.42**	0.18**	-0.10	0.05

M-E, Morningness-Eveningness; RAI, Relative Autonomy Index; Gender is coded 0 = girls, 1 = boys

\* $p < 0.05$

\*\* $p < 0.01$

**Future Time Perspective**

$$R(FTP) = [(-.37)+(-.326)]/2 = -.348$$

$r = -.37$  (Mao et al., 2022)

Mao, B., Chen, S., Wei, M., Luo, Y., & Liu, Y. (2022). Future Time Perspective and Bedtime Procrastination: The mediating role of dual-mode self-control and problematic smartphone use. *International Journal of Environmental Research and Public Health*, 19(16), Article 10334. <https://doi.org/10.3390/ijerph191610334>

**Table 1.** Descriptive statistics and correlations among variables.

Variable	M	SD	FTP	IS	CS	PSU	BP
FTP	3.51	0.66	-				
IS	2.42	0.68	-0.41 ***	-			
CS	3.44	0.60	0.58 ***	-0.42 ***	-		
PSU	3.35	0.98	-0.30 ***	0.47 ***	-0.24 ***	-	
BP	3.20	0.74	-0.37 ***	0.39 ***	-0.31 ***	0.46 ***	-

Note. FTP, future time perspective; IS, impulse system; CS, control system; PSU, problematic smartphone use; BP, bedtime procrastination. \*\*\*  $p < 0.001$ .

$r = -.326$  (Chen et al., 2022)

Chen, D., Zhang, Y., Lin, J., Pang, D., Cheng, D., & Si, D. (2022). Factors influencing bedtime procrastination in junior college nursing students: a cross-sectional study. *BMC nursing*, 21(1), 1-8. <https://doi.org/10.1186/s12912-022-00881-7>

**Table 2** Correlation analysis of factors influencing bedtime procrastination of junior college nursing students ( $n = 1827$ )

Items	Mean ± SD	Bedtime Procrastination
Bedtime Procrastination	25.11 ± 6.88	1
Extroversion	8.79 ± 2.40	-0.075**
Agreeableness	10.18 ± 2.12	-0.230**
Conscientiousness	9.56 ± 2.21	-0.323**
Neuroticism	9.05 ± 2.26	-0.334**
Openness	9.39 ± 2.09	-0.237**
Cognitive Subscale	16.76 ± 2.70	0.363**
Behavioral Subscale	12.79 ± 4.62	0.315**
Emotional Subscale	12.92 ± 3.67	0.388**
Self-regulatory Fatigue	42.47 ± 9.46	0.408**
Behavioral Commitment	11.01 ± 2.86	-0.300**
Far-reach Goal Orientation	7.91 ± 0.89	-0.208**
Future Efficacy	11.18 ± 3.02	-0.227**
Future Purpose Consciousness	13.34 ± 1.84	-0.264**
Future Image	11.39 ± 2.22	-0.244**
Future Time Perspective	54.82 ± 8.46	-0.326**
Thirst	6.18 ± 3.10	0.233**
Withdrawal	12.70 ± 6.21	0.280**
Reaction of Body and Mind	8.69 ± 4.24	0.335**
Problematic Mobile Phone Use	27.57 ± 12.58	0.309**

Note \*\* $p < 0.01$

**Calculation for sample size**

With equation of  $\frac{R^2}{1-R^2}$ , hereby calculate the effect size for self-control and bedtime procrastination:

$$\left(\frac{(-0.389)^2}{1-(-0.389)^2}\right) = \frac{0.151}{0.849} = 0.178$$

With equation of  $\frac{R^2}{1-R^2}$ , hereby calculate the effect size for chronotype and bedtime procrastination:

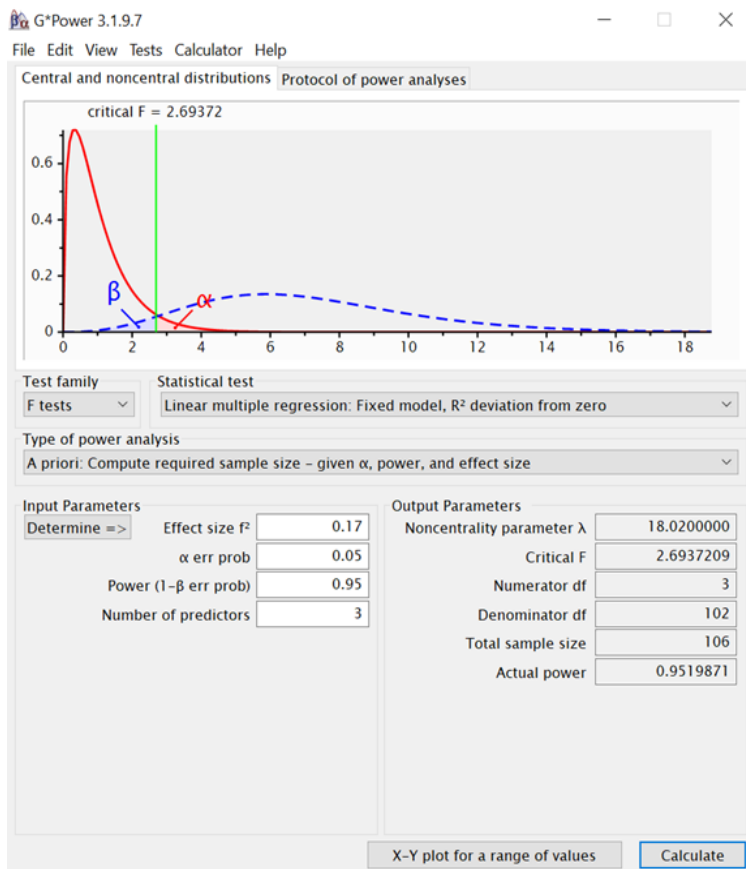
$$\left(\frac{(-0.4)^2}{1-(-0.4)^2}\right) = \frac{0.16}{0.84} = 0.190$$

With equation of  $\frac{R^2}{1-R^2}$ , hereby calculate the effect size for future time perspective and bedtime procrastination:

$$\left(\frac{(-0.348)^2}{1-(-0.348)^2}\right) = \frac{0.121}{0.879} = 0.138$$

Effect size for our study:

$$\frac{0.178 + 0.190 + 0.138}{3} = 0.17$$



Suggested sample size = 106

Appendix C: Data Collection Poster

**WE NEED PARTICIPANTS!**  
Self-control, Chronotype,  
and Future Time Perspective as Predictors  
of Bedtime Procrastination among  
Malaysian Young Adults

**IF YOU ARE**

- Malaysian
- Between 18-29 years old
- **NOT** experiencing any sleep problems or disorders (e.g., insomnia, narcolepsy)
- **NOT** working on a night shift or shift rotation.

**SCAN HERE** The survey takes 15-20 minutes to complete ~

Your response will be anonymous !

For more information, contact the student researchers:

horyinn@lutar.my (Tan Hor Yinn)  
isaaclaw@lutar.my (Isaac law Lik Jun)  
synjieh@lutar.my (Leong Syn Jieh)



## Appendix D: Informed Consent



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

### Introduction

Good day everyone! We are final year undergraduates of Bachelor of Social Science (Hons) Psychology in Universiti Tunku Abdul Rahman (UTAR) Kampar campus. We would like to invite you to participate in a study for our Final Year Project titled: **Self-Control, Chronotype, and Future Time Perspective as Predictors of Bedtime Procrastination among Malaysian Young Adults.**

### Procedures and Confidentiality

The following questionnaire will require approximately 15-20 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 be used for academic purpose.

### Eligibility Criteria for Participants

We are looking for individuals who fulfill the following criteria:

1. Malaysian
2. Aged between 18 to 29 years old
3. Not experiencing any sleeping problems or disorders (e.g., insomnia, narcolepsy)
4. Not working night shift or on shift rotation (night shift and morning shift)

### 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 the group members. Participation 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.

0% \_\_\_\_\_ 100%

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(Co. No. 578227-M)  
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.**

**Notice:**

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

- For assessment of any application to UTAR
- For processing any benefits and services
- For communication purposes
- For advertorial and news
- For general administration and record purposes
- For enhancing the value of education
- For educational and related purposes consequential to UTAR
- For the purpose of our corporate governance
- For the purposes of conducting research/ collaboration

2. 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.

3. 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.

4. 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**

5. 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.

6. 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.

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

1. horyinn@1utar.my (Tan Hor Yinn)
2. isaacław@1utar.my (Isaac law Lik Jun)
3. synjieh@1utar.my (Leong Syn Jieh)

**Acknowledgment of Personal Data Protection Notice**

I have been notified and that I hereby understood, consented and agreed per UTAR above notice.

I disagree, my personal data will not be processed.



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By selecting "Yes, I agree", it means that I agree to give consent to participate in the study and have read the following:

1. I have read and understood the Participant Information Sheet.
2. I am willing to answer statements and questions about self-control, chronotype, future time perspective and bedtime procrastination.
3. I understand that once my responses are submitted, there will be no method possible to identify, retrieve, or delete my data unless I optionally choose to provide my email address at the end of my responses.
4. I understand that any information I provide is confidential, and that no information that I disclose will lead to the identification in the reports on the project, either by the researcher or by any other party.
5. I consent to my data being used anonymously for academic purpose only.
6. I am aware that I can withdraw and be allowed to drop out at any time possible.
7. I consent to my data being used anonymously for publication.

Yes, I agree

No, I do not agree

<<

0%  100%

>>

**Appendix E: Questionnaire**

**Section A: Demographic information**

Age				
Gender	Male		Female	
Ethnicity	Malay	Chinese	Indian	Other:
Employment status	Employed	Unemployed		Student
Current level of education	Pre-university	Undergraduate	Postgraduate	Not studying
Which state do you currently live in? (e.g., Selangor, Penang, Kedah)				

**Section B: Eligibility Checking**

Nationality	Malaysian	Non-Malaysian
Do you have any sleep problems or disorders (e.g., insomnia, narcolepsy)?	Yes	No
Are you working on a night shift or shift rotation?	Yes	No

**Section C: Bedtime Procrastination**

*Bedtime Procrastination Scale (BPS; Kroese et al., 2014a)*

For each of the following statements, please decide whether it applies to you using a scale from 1 (Almost never) to 5 (Almost always)

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Almost never</b>	<b>Rarely</b>	<b>Sometimes</b>	<b>Frequently</b>	<b>Almost always</b>

No.	Items	Scale				
		1	2	3	4	5
1	I go to bed later than I had intended.	1	2	3	4	5
2	I go to bed early if I have to get up early in the morning.	1	2	3	4	5
3	If it is time to turn off the lights at night I do it immediately.	1	2	3	4	5
4	Often I am still doing other things when it is time to go to bed.	1	2	3	4	5
5	I easily get distracted by things when I actually would like to go to bed.	1	2	3	4	5
6	I do not go to bed on time.	1	2	3	4	5
7	I have a regular bedtime which I keep to.	1	2	3	4	5
8	I want to go to bed on time but I just don't.	1	2	3	4	5
9	I can easily stop with my activities when it is time to go to bed.	1	2	3	4	5

**Section D: Self-Control**

*Brief Self-Control Scale (BSCS; Tangney et al., 2004)*

Using the scale provided, please indicate how much each of the following statements reflects how you typically are.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Not at all</b>	<b>Only a little</b>	<b>To some extent</b>	<b>Rather much</b>	<b>Very much</b>

No.	Items	Scale				
		1	2	3	4	5
1	I am good at resisting temptation.	1	2	3	4	5
2	I have a hard time breaking bad habits.	1	2	3	4	5
3	I am lazy.	1	2	3	4	5
4	I say inappropriate things.	1	2	3	4	5
5	I do certain things that are bad for me, if they are fun.	1	2	3	4	5
6	I refuse things that are bad for me.	1	2	3	4	5
7	I wish I had more self-discipline.	1	2	3	4	5
8	People would say that I have iron self-discipline.	1	2	3	4	5
9	Pleasure and fun sometimes keep me from getting work done.	1	2	3	4	5
10	I have trouble concentrating.	1	2	3	4	5

11	I am able to work effectively toward long-term goals.	1	2	3	4	5
12	Sometimes I can't stop myself from doing something, even if I know it is wrong.	1	2	3	4	5
13	I often act without thinking through all the alternatives.	1	2	3	4	5



**Section E: Chronotype**

*Morningness-Eveningness Questionnaire (MEQ; Horne & Ostberg, 1976)*

- Please read each question very carefully before answering.
- Please answer each question as honestly as possible.
- Answer ALL questions.
- Each question should be answered independently of others. Do NOT go back and check your answers.

1. What time would you get up if you were entirely free to plan your day?

5:00 – 6:30 AM	5
6:30 – 7:45 AM	4
7:45 – 9:45 AM	3
9:45 – 11:00 AM	2
11:00 AM – 12 NOON	1
12 NOON – 5:00 AM	0

2. What time would you go to bed if you were entirely free to plan your evening?

8:00 – 9:00 PM	5
9:00 – 10:15 PM	4
10:15 PM – 12:30 AM	3
12:30 – 1:45 AM	2
1:45 – 3:00 AM	1
3:00 AM – 8:00 PM	0

3. If there is a specific time at which you have to get up in the morning, to what extent do you depend on being woken up by an alarm clock?

Not at all dependent	4
Slightly dependent	3

Fairly dependent	2
Very dependent	1

4. How easy do you find it to get up in the morning (when you are not woken up unexpectedly)?

Not at all easy	1
Not very easy	2
Fairly easy	3
Very easy	4

5. How alert do you feel during the first half hour after you wake up in the morning?

Not at all alert	1
Slightly alert	2
Fairly alert	3
Very alert	4

6. How hungry do you feel during the first half-hour after you wake up in the morning?

Not at all hungry	1
Slightly hungry	2
Fairly hungry	3
Very hungry	4

7. During the first half-hour after you wake up in the morning, how tired do you feel?

Very tired	1
Fairly tired	2
Fairly refreshed	3

Very refreshed	4
----------------	---

8. If you have no commitments the next day, what time would you go to bed compared to your usual bedtime?

Seldom or never later	4
Less than one hour later	3
1-2 hours later	2
More than two hours later	1

9. You have decided to engage in some physical exercise. A friend suggests that you do this for one hour twice a week and the best time for him is between 7:00 – 8:00 am. Bearing in mind nothing but your own internal “clock”, how do you think you would perform?

Would be in good form	4
Would be in reasonable form	3
Would find it difficult	2
Would find it very difficult	1

10. At what time of day do you feel you become tired as a result of need for sleep?

8:00 – 9:00 PM	5
9:00 – 10:15 PM	4
10:15 PM – 12:45 AM	3
12:45 – 2:00 AM	2
2:00 – 3:00 AM	1

11. You want to be at your peak performance for a test that you know is going to be mentally exhausting and will last for two hours. You are entirely free to plan your day. Considering only your own internal “clock”, which ONE of the four testing times would you choose?

8:00 AM – 10:00 AM	4
11:00 AM – 1:00 PM	3
3:00 PM – 5:00 PM	2
7:00 PM – 9:00 PM	1

13. For some reason you have gone to bed several hours later than usual, but there is no need to get up at any particular time the next morning. Which ONE of the following are you most likely to do?

Will wake up at usual time, but will NOT fall back asleep	4
Will wake up at usual time and will doze thereafter	3
Will wake up at usual time but will fall asleep again	2
Will NOT wake up until later than usual	1

15. You have to do two hours of hard physical work. You are entirely free to plan your day and considering only your own internal “clock” which ONE of the following time would you choose?

8:00 AM – 10:00 AM	4
11:00 AM – 1:00 PM	3
3:00 PM – 5:00 PM	2
7:00 PM – 9:00 PM	1

17. Suppose that you can choose your own work hours. Assume that you worked a FIVE hour day (including breaks) and that your job was interesting and paid by results). Which FIVE CONSECUTIVE HOURS would you select?

5 hours starting between 4:00 AM and 8:00 AM	5
5 hours starting between 8:00 AM and 9:00 AM	4
5 hours starting between 9:00 AM and 2:00 PM	3

5 hours starting between 2:00 PM and 5:00 PM	2
5 hours starting between 5:00 PM and 4:00 AM	1

18. At what time of the day do you think that you reach your “feeling best” peak?

5:00 – 8:00 AM	5
8:00 – 10:00 AM	4
10:00 AM – 5:00 PM	3
5:00 – 10:00 PM	2
10:00 PM – 5:00 AM	1

19. One hears about “morning” and “evening” types of people. Which ONE of these types do you consider yourself to be?

Definitely a “morning” type	6
Rather more a “morning” than an “evening” type	4
Rather more an “evening” than a “morning” type	2
Definitely an “evening” type	0

**Section F: Future Time Perspective**

*Zimbardo Time Perspective Inventory (ZTPI) - Future subscale (Zimbardo & Boyd, 1999)*

How characteristic or true is this of you?

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Very uncharacteristic</b>	<b>Uncharacteristic</b>	<b>Neutral</b>	<b>Characteristic</b>	<b>Very characteristic</b>

No.	Items	Scale				
		1	2	3	4	5
1	I believe that a person's day should be planned ahead each morning.	1	2	3	4	5
2	If things don't get done on time, I don't worry about it.	1	2	3	4	5
3	When I want to achieve something, I set goals and consider specific means for reaching those goals.	1	2	3	4	5
4	Meeting tomorrow's deadlines and doing other necessary work comes before tonight's play.	1	2	3	4	5
5	It upsets me to be late for appointments.	1	2	3	4	5
6	I meet my obligations to friends and authorities on time.	1	2	3	4	5
7	I take each day as it is rather than try to plan it out.	1	2	3	4	5
8	Before making a decision, I weigh the costs against the benefits.	1	2	3	4	5
9	I complete projects on time by making steady progress.	1	2	3	4	5
10	I make lists of things to do.	1	2	3	4	5

11	I am able to resist temptations when I know that there is work to be done.	1	2	3	4	5
12	I keep working at difficult, uninteresting tasks if they will help me get ahead.	1	2	3	4	5
13	There will always be time to catch up on my work	1	2	3	4	5

**Appendix F: Reliability Tests**

**Bedtime Procrastination Scale**

**Reliability Statistics**

Cronbach's Alpha	N of Items
.852	9

**Brief Self-Control Scale**

**Reliability Statistics**

Cronbach's Alpha	N of Items
.866	13

**Morningness-Eveningness Scale**

**Reliability Statistics**

Cronbach's Alpha	N of Items
.700	16

**Zimbardo Time Perspective Inventory (ZTPI) Future Subscale**

**Reliability Statistics**

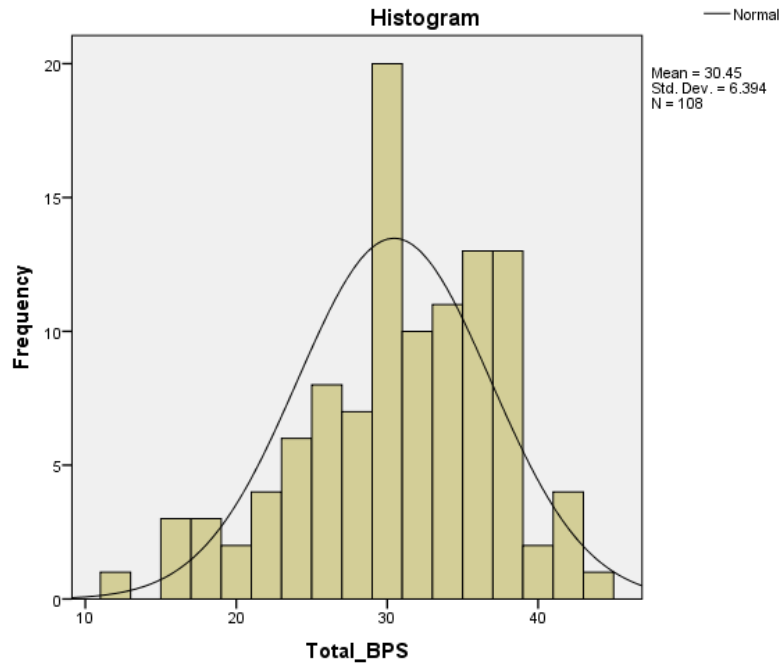
Cronbach's Alpha	N of Items
.660	13



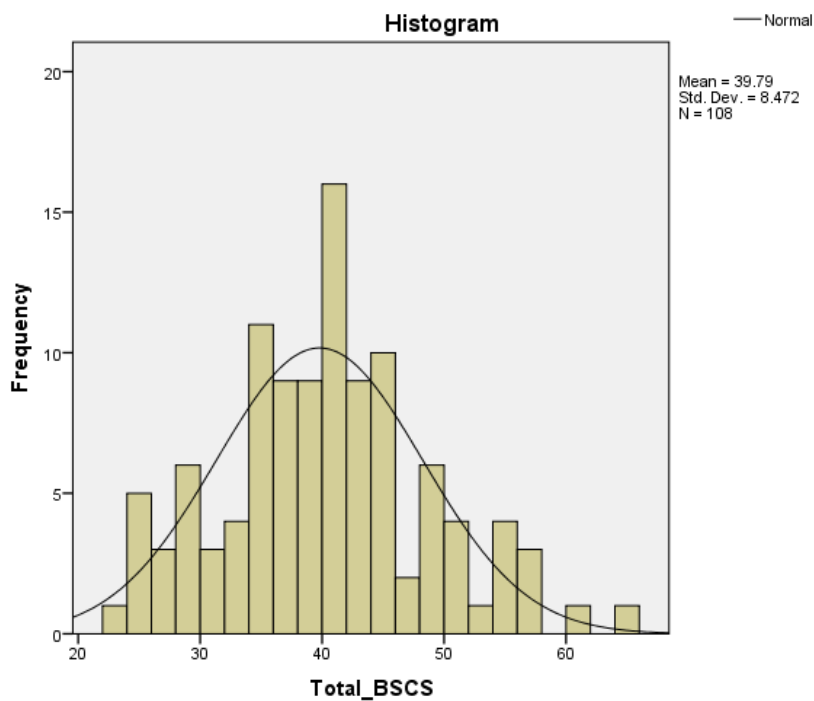
Appendix G: Histogram and Q-Q Plots

Histogram

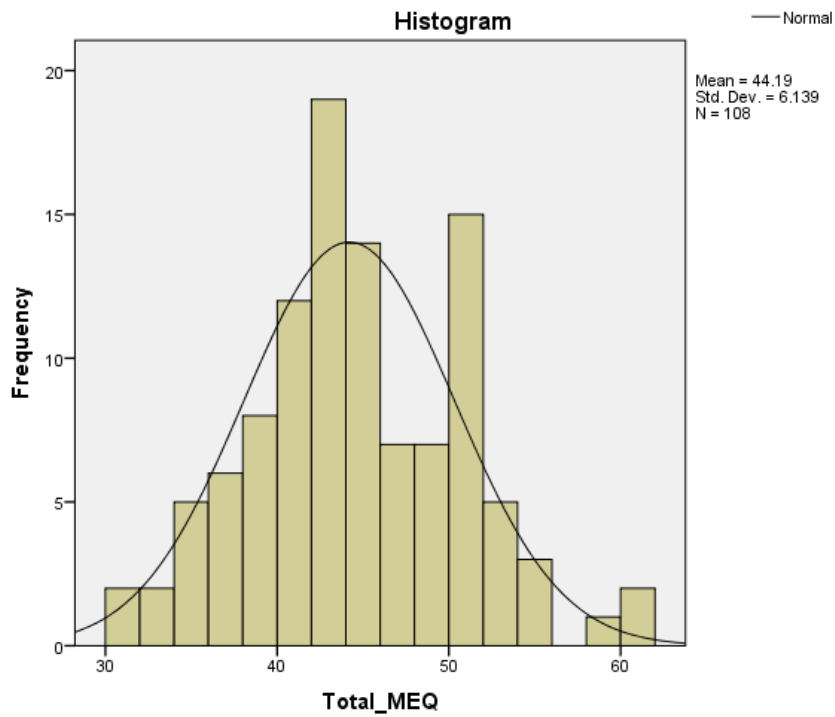
Bedtime Procrastination



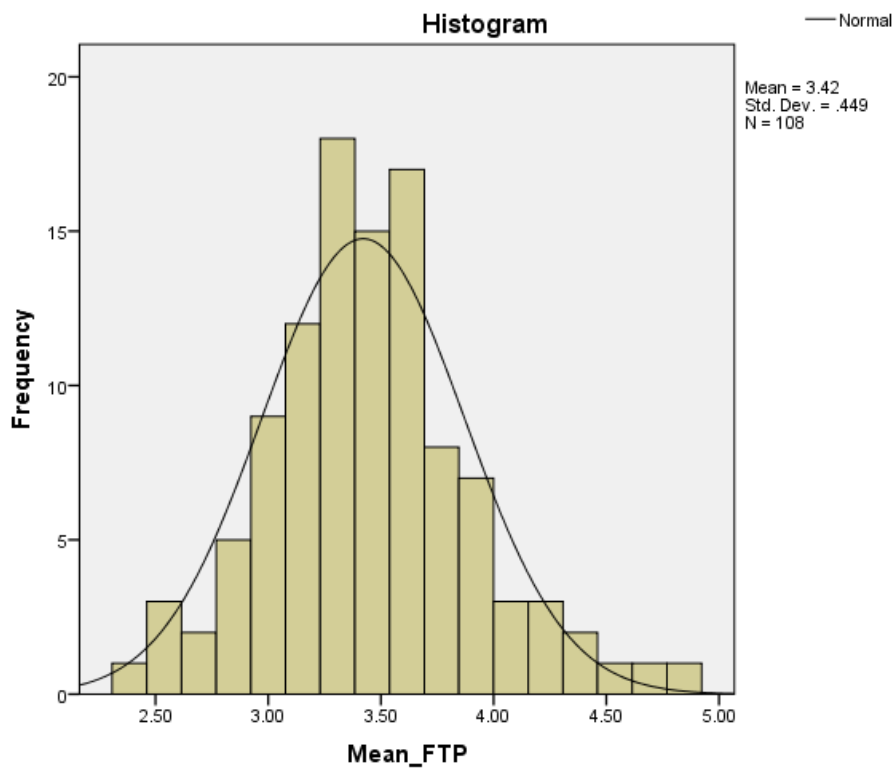
Self-Control



### Chronotype

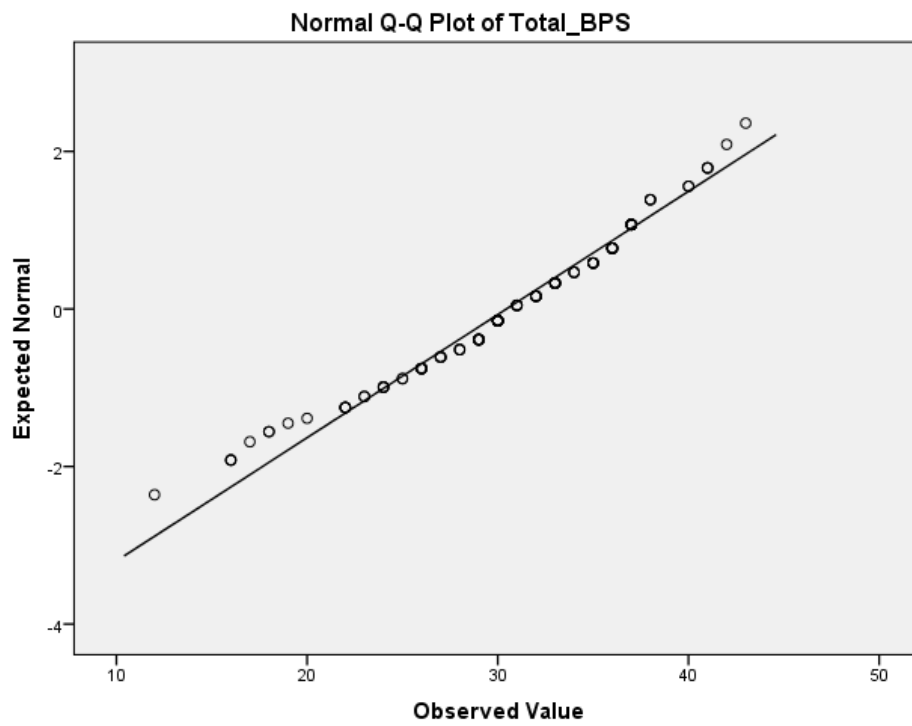


### Future Time Perspective

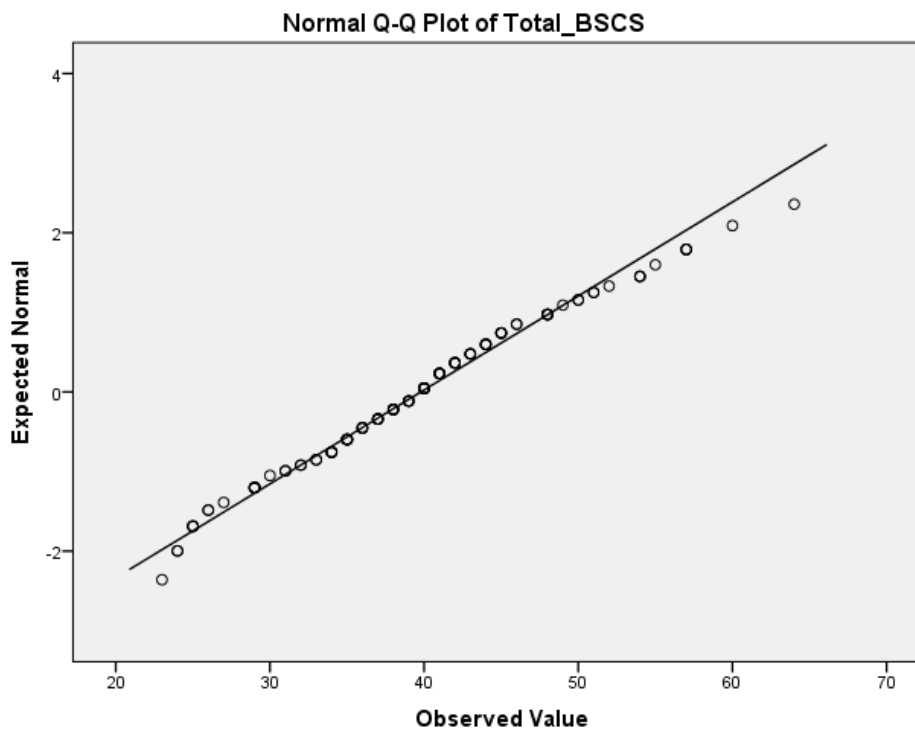


Normal Q-Q Plot

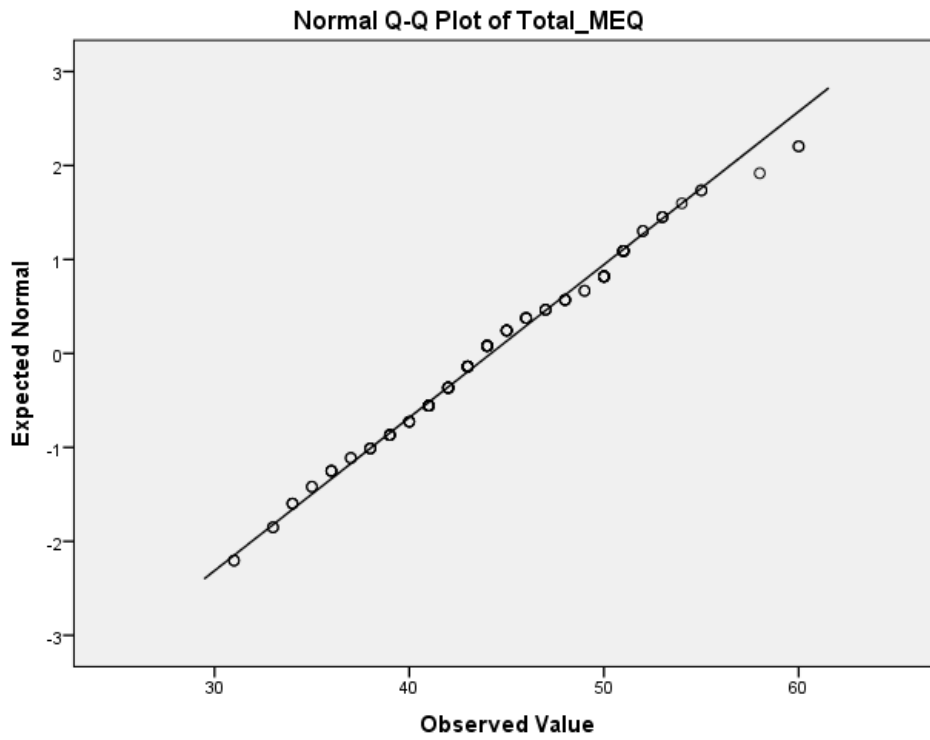
Bedtime Procrastination



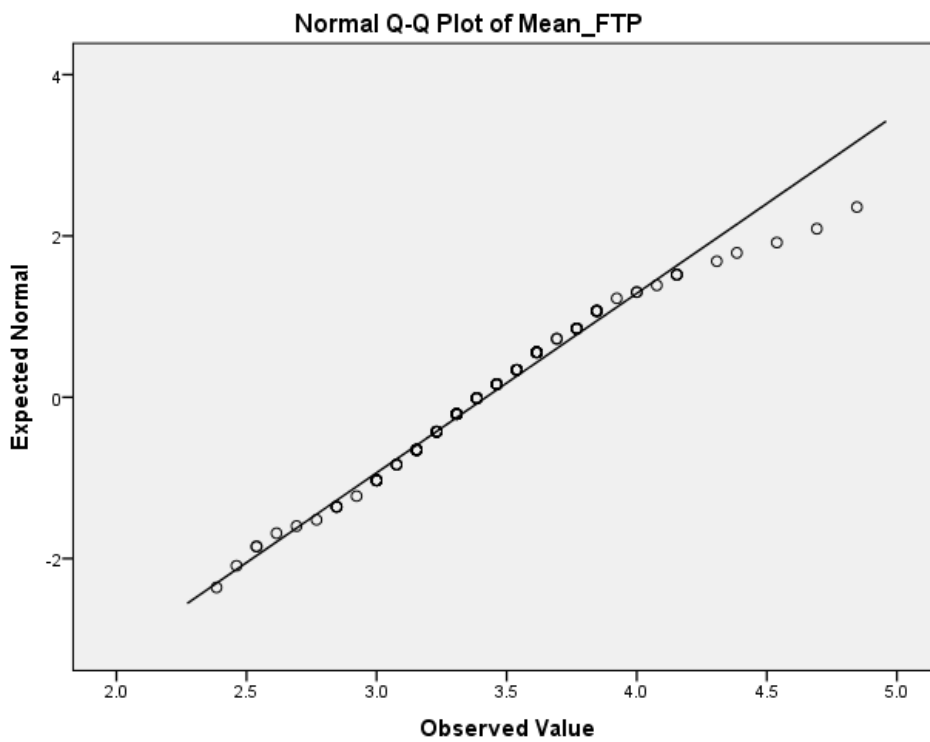
Self-Control



### Chronotype



### Future Time Perspective



**Appendix H: Skewness and Kurtosis Test**

**Statistics**

		Bedtime Procrastination	Self-Control	Chronotype	Future Time Perspective
N	Valid	108	108	108	108
	Missing	0	0	0	0
Skewness		-.538	.298	.173	.458
Std. Error of Skewness		.233	.233	.233	.233
Kurtosis		.046	.049	-.150	.889
Std. Error of Kurtosis		.461	.461	.461	.461

**Appendix I: Kolmogorov-Smirnov Test**

**Tests of Normality**

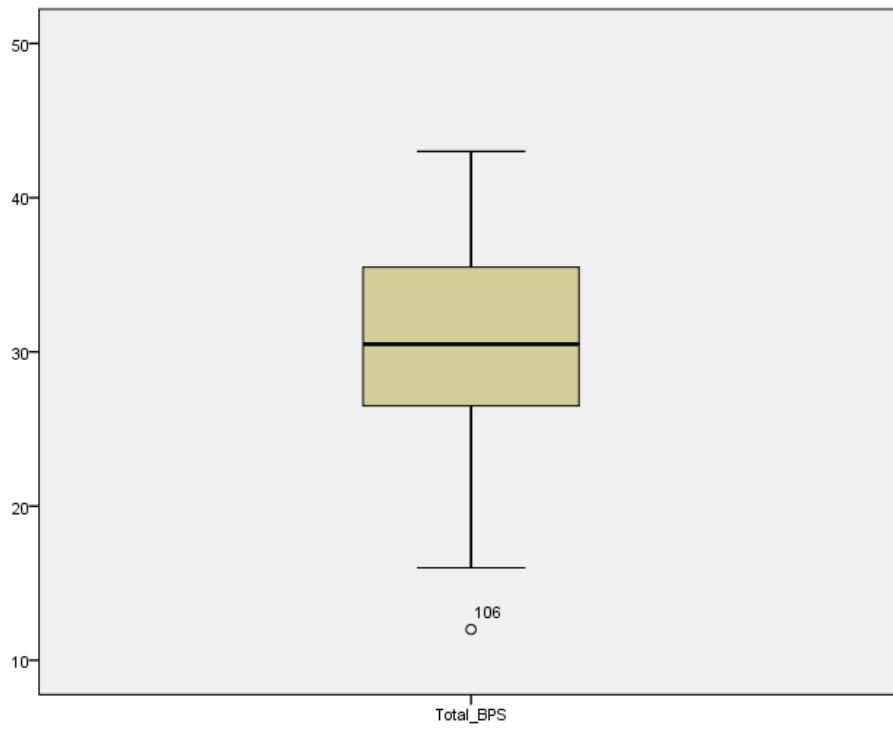
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Bedtime Procrastination	.095	108	.017	.972	108	.022
Self-control	.065	108	.200 <sup>*</sup>	.984	108	.219
Chronotype	.077	108	.118	.987	108	.364
Future Time Perspective	.092	108	.026	.978	108	.070

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

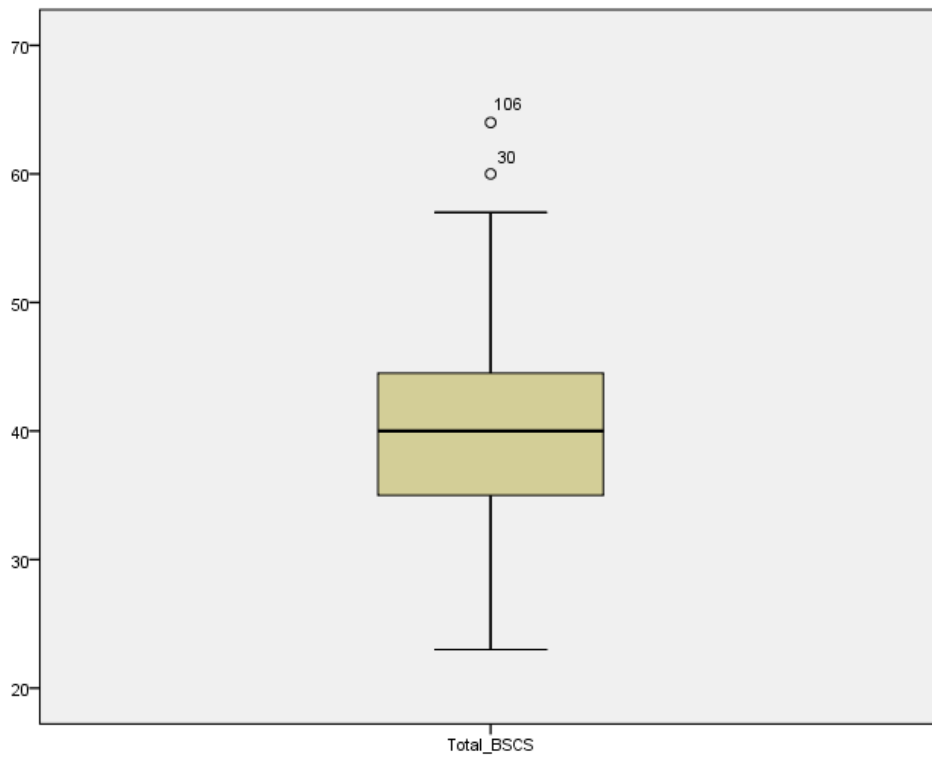
a. Lilliefors Significance Correction

**Appendix J: Boxplot**

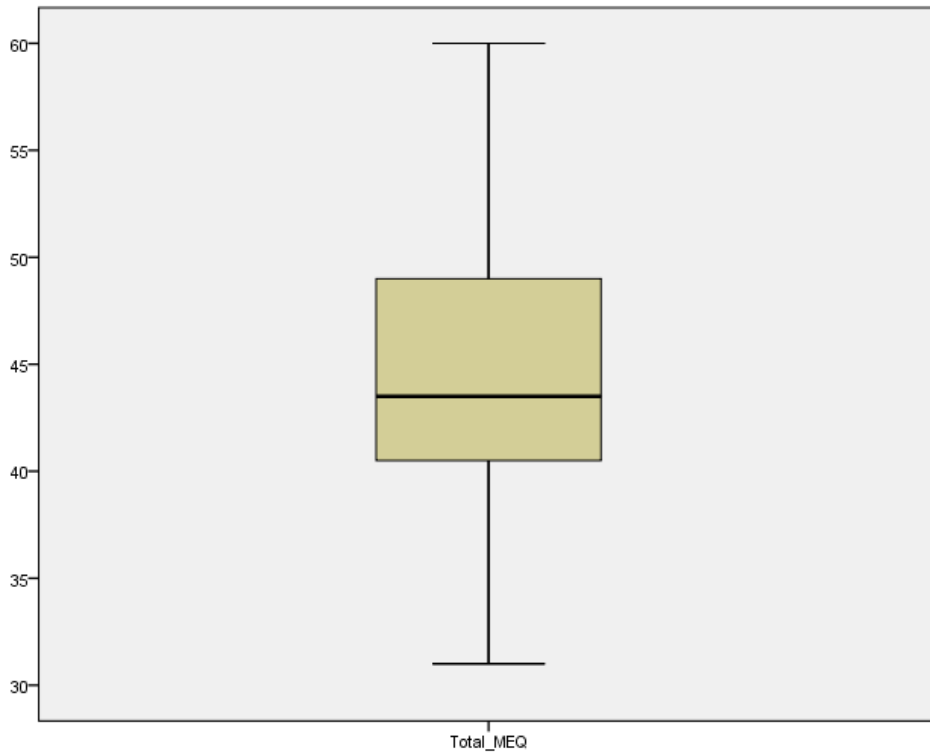
**Bedtime Procrastination**



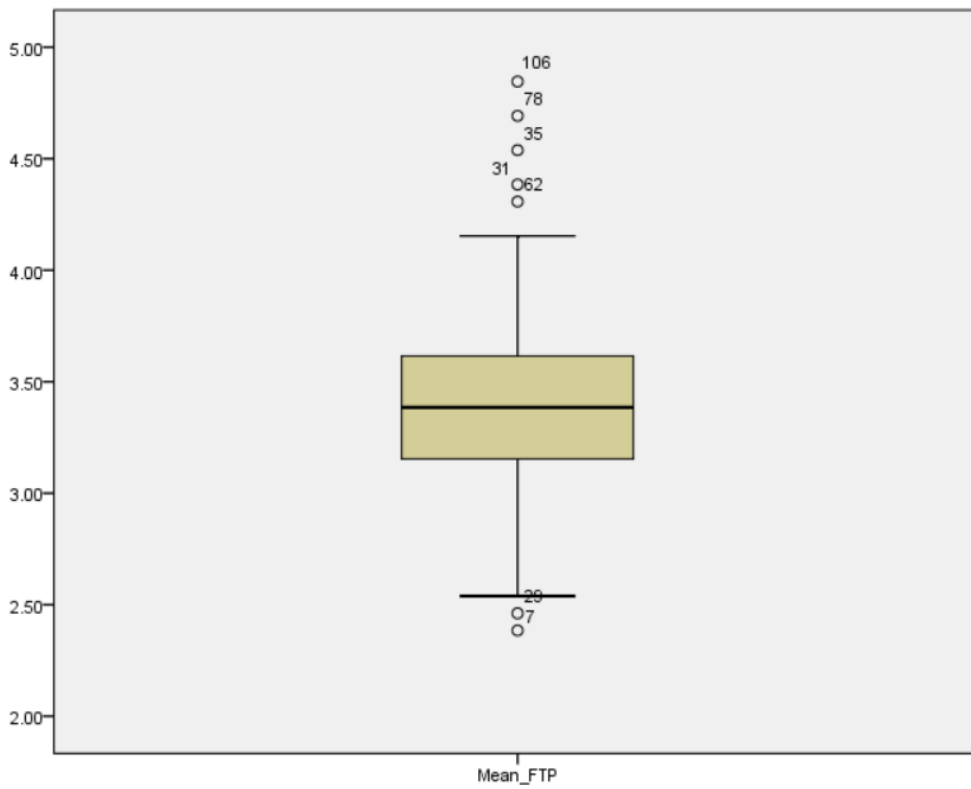
**Self-Control**



### Chronotype



### Future Time Perspective





**Appendix K: Case Summaries**

**Case Summaries<sup>a</sup>**

	Case Number	Mahalanobis Distance	Cook's Distance	Centered Leverage Value
1	1	2.55001	.00477	.02383
2	2	.99012	.00775	.00925
3	3	3.33246	.00696	.03114
4	4	4.48323	.02648	.04190
5	5	.12949	.01718	.00121
6	6	1.18737	.00224	.01110
7	7	7.52536	.00322	.07033
8	8	1.76445	.00193	.01649
9	9	.66841	.00284	.00625
10	10	2.24976	.00160	.02103
11	11	.13083	.00024	.00122
12	12	1.31394	.01552	.01228
13	13	.04134	.00008	.00039
14	14	1.92092	.02350	.01795
15	15	.31166	.00015	.00291
16	16	.03591	.00001	.00034
17	17	1.36842	.00118	.01279
18	18	2.79488	.00838	.02612
19	19	3.13342	.00463	.02928
20	20	2.67829	.00003	.02503
21	21	2.13577	.00147	.01996
22	22	.44307	.00128	.00414
23	23	1.35337	.00111	.01265
24	24	9.48393	.00028	.08863
25	25	7.79432	.01071	.07284
26	26	.83171	.00622	.00777
27	27	.39027	.00404	.00365
28	28	1.55108	.00204	.01450
29	29	5.26207	.00656	.04918

30	30	8.36617	.03276	.07819
31	31	5.01512	.07592	.04687
32	32	2.26016	.00661	.02112
33	33	3.76360	.00039	.03517
34	34	4.69091	.00156	.04384
35	35	6.99759	.01619	.06540
36	36	2.35214	.00188	.02198
37	37	4.78649	.00453	.04473
38	38	3.13467	.00126	.02930
39	39	2.29640	.04244	.02146
40	40	1.00403	.00292	.00938
41	41	.21274	.00357	.00199
42	42	2.46413	.00610	.02303
43	43	1.57620	.03811	.01473
44	44	3.60297	.00229	.03367
45	45	4.11195	.00040	.03843
46	46	2.94215	.07079	.02750
47	47	1.88636	.00335	.01763
48	48	.65445	.00353	.00612
49	49	5.14106	.02255	.04805
50	50	12.60303	.01696	.11779
51	51	1.98055	.00002	.01851
52	52	.51657	.00097	.00483
53	53	7.71371	.00056	.07209
54	54	.13965	.00050	.00131
55	55	2.56822	.02119	.02400
56	56	2.35221	.00102	.02198
57	57	1.92002	.00181	.01794
58	58	3.69256	.00318	.03451
59	59	1.23369	.00004	.01153
60	60	2.25725	.01093	.02110
61	61	1.40311	.00522	.01311
62	62	5.27964	.00457	.04934
63	63	.91558	.01547	.00856

64	64	4.82020	.03144	.04505
65	65	2.51091	.01044	.02347
66	66	2.80658	.00486	.02623
67	67	1.14865	.00366	.01074
68	68	.55754	.00307	.00521
69	69	1.08621	.00007	.01015
70	70	2.06622	.00000	.01931
71	71	8.14655	.00416	.07614
72	72	.39284	.01205	.00367
73	73	5.22882	.01624	.04887
74	74	1.73195	.00005	.01619
75	75	11.20900	.01398	.10476
76	76	5.98742	.00833	.05596
77	77	3.94303	.03124	.03685
78	78	9.86635	.02501	.09221
79	79	1.50240	.00530	.01404
80	80	3.83572	.00003	.03585
81	81	4.00325	.01198	.03741
82	82	.29456	.00056	.00275
83	83	7.14000	.01058	.06673
84	84	.50106	.00218	.00468
85	85	4.97426	.00596	.04649
86	86	1.65527	.01473	.01547
87	87	2.43891	.00129	.02279
88	88	1.51271	.00196	.01414
89	89	4.82167	.02382	.04506
90	90	1.28711	.00021	.01203
91	91	3.70748	.01475	.03465
92	92	1.46752	.01656	.01372
93	93	9.00748	.00029	.08418
94	94	2.41528	.02026	.02257
95	95	.88690	.00224	.00829
96	96	.58782	.00578	.00549
97	97	1.58887	.00030	.01485

98		98	2.02634	.00069	.01894
99		99	1.15817	.00009	.01082
100		100	3.09861	.00214	.02896
101		101	.06921	.00417	.00065
102		102	1.14713	.00896	.01072
103		103	1.55824	.00001	.01456
104		104	.86201	.00321	.00806
105		105	.46712	.00008	.00437
106		106	14.06332	.07835	.13143
107		107	1.45458	.00067	.01359
108		108	.27378	.00035	.00256
Total	N		108	108	108

a. Limited to first 108 cases.

**Appendix L: Descriptive Statistics**

**Descriptive Statistics of Sample**

	Age	Gender	Ethnicity - Selected Choice	Current level of education	Employment status	Marital status	Which state do you currently live in?
N Valid	108	108	108	108	108	108	108
Missing	0	0	0	0	0	0	0
Mean	22.28	1.57	1.94	2.18	2.49	1.23	4.53
Std. Deviation	1.894	.497	.584	.734	.859	.485	2.639
Minimum	19	1	1	1	1	1	1
Maximum	29	2	4	4	3	3	13
Sum	2406	170	209	235	269	133	489

**Age**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 19	5	4.6	4.6	4.6
20	11	10.2	10.2	14.8
21	13	12.0	12.0	26.9
22	43	39.8	39.8	66.7
23	19	17.6	17.6	84.3
24	6	5.6	5.6	89.8
25	5	4.6	4.6	94.4
26	2	1.9	1.9	96.3
28	2	1.9	1.9	98.1
29	2	1.9	1.9	100.0
Total	108	100.0	100.0	

**Gender**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	46	42.6	42.6	42.6
Female	62	57.4	57.4	100.0
Total	108	100.0	100.0	

**Ethnicity - Selected Choice**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Malay	20	18.5	18.5	18.5
Chinese	77	71.3	71.3	89.8
Indian	9	8.3	8.3	98.1
Other:	2	1.9	1.9	100.0
Total	108	100.0	100.0	

**Current level of education**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Pre-university (e.g., Diploma, A-Level, STPM, Foundation, etc.)	10	9.3	9.3	9.3
Undergraduate	80	74.1	74.1	83.3
Postgraduate	7	6.5	6.5	89.8
Not studying	11	10.2	10.2	100.0
Total	108	100.0	100.0	

**Employment status**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Employed	26	24.1	24.1	24.1
	Unemployed	3	2.8	2.8	26.9
	Student	79	73.1	73.1	100.0
	Total	108	100.0	100.0	

**Marital status**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	86	79.6	79.6	79.6
	In a relationship	19	17.6	17.6	97.2
	Married	3	2.8	2.8	100.0
	Total	108	100.0	100.0	

**Which state do you currently live in?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Perlis	5	4.6	4.6	4.6
	Kedah	7	6.5	6.5	11.1
	Penang	25	23.1	23.1	34.3
	Perak	32	29.6	29.6	63.9
	Selangor	27	25.0	25.0	88.9
	Negeri Sembilan	1	.9	.9	89.8
	Kelantan	1	.9	.9	90.7
	Johor	4	3.7	3.7	94.4
	Sarawak	6	5.6	5.6	100.0
	Total	108	100.0	100.0	

**Descriptive Statistics of Main Variable**

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
Bedtime Procrastination	108	12	43	3289	30.45	6.394
Self-Control	108	23	64	4297	39.79	8.472
Chronotype	108	31	60	4773	44.19	6.139
Future Time Perspective	108	2.38	4.85	369.46	3.4209	.44921
Valid N (listwise)	108					

**Appendix M: Multiple Linear Regression**

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.548 <sup>a</sup>	.301	.280	5.424	2.184

a. Predictors: (Constant), Future Time Perspective, Chronotype, Self-control

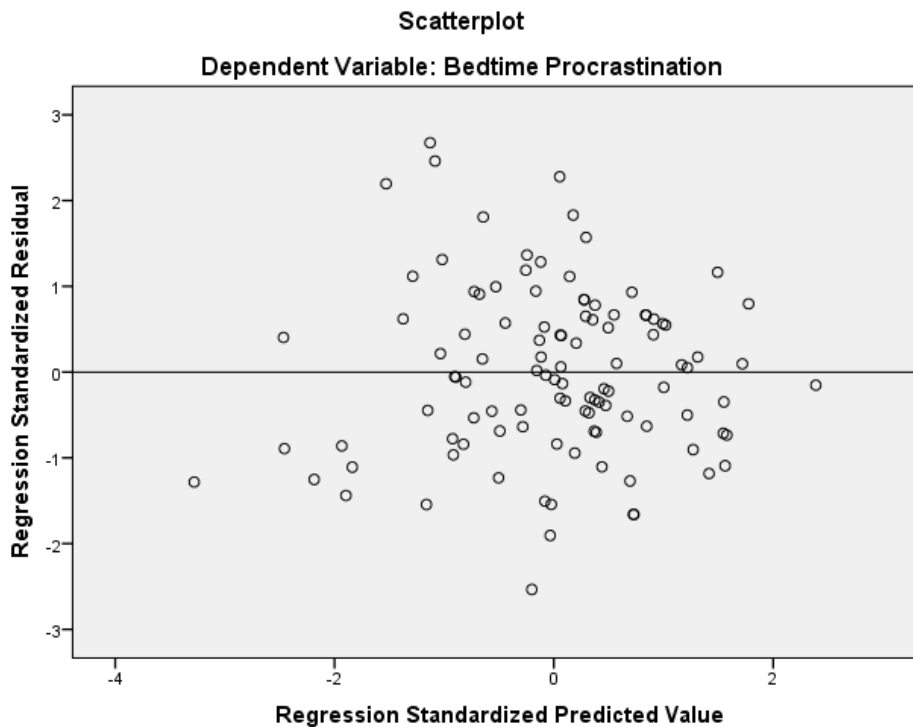
b. Dependent Variable: Bedtime Procrastination

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	29.544	6.274		4.709	.000	17.103	41.985		
	Self-control	-.336	.073	-.445	-4.602	.000	-.480	-.191	.720	1.388
	Chronotype	.295	.088	.283	3.362	.001	.121	.468	.950	1.053
	Future Time Perspective	.363	1.394	.025	.260	.795	-2.403	3.128	.701	1.427

a. Dependent Variable: Bedtime Procrastination

**Scatterplot of Standardised Predicted Value and Standardised Residual**





**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1314.917	3	438.306	14.897	.000 <sup>b</sup>
	Residual	3059.851	104	29.422		
	Total	4374.769	107			

a. Dependent Variable: Bedtime Procrastination

b. Predictors: (Constant), Future Time Perspective, Chronotype, Self-control