SLEEP QUALITY AND THE ASSOCIATED FACTORS AMONG UNDERGRADUATE STUDENTS AT HEALTH CAMPUS, USM

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DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledge. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institution. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research, and promotional purposes.

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ABSTRAK

Adalah diakui bahawa kualiti tidur sering bertambah buruk pada pelajar universiti.Kurangnya kesedaran tentang gejala dan rawatan awal boleh membawa kepada penyakit lain.Oleh itu, kajian ini bertujuan untuk menyiasat kualiti tidur dan faktor-faktor yang berkaitan di kalangan pelajar sarjana di Kampus Kesihatan USM.Seramai 250 pelajar sarjana muda, berusia antara 19 hingga 30 tahun dari tiga sekolah (Sains Kesihatan, Perubatan dan Pergigian) terlibat dalam kajian ini.Reka bentuk kajian keratan rentas telah digunakan. Data dikumpulkan melalui satu set soal selidik (PSQI) yang disesuaikan dari Buysse et al.(1989) dan Soal Selidik Aktiviti Fizikal Antarabangsa (IPAQ) kemudian dianalisis menggunakan SPSS versi 26.Ujian Pearson Chi-Square digunakan untuk mengenal pasti hubungan antara ciri-ciri sosio-demografi (jantina, indeks jisim badan, aktiviti fizikal dan corak tidur) dengan kualiti tidur.Majoriti responden dalam kajian ini mempunyai tahap kualiti tidur yang lemah (n= 203, 81.2%).Di antara empat faktor tersebut, hanya jantina yang didapati tidak mempunyai kaitan yang signifikan dengan kualiti tidur (p= 0.071).Manakala tiga faktor lain; indeks jisim badan (p= 0.08), aktiviti fizikal (p= 0.002) dan corak tidur (p = 0.001) telah didapati mempunyai kaitan yang signifikan dengan kualiti tidur.Sebaliknya, kebanyakan pelajar sarjana mempunyai tahap kualiti tidur yang buruk dan sederhana aktif (n = 98, 39.2%).Penemuan ini menunjukkan bahawa terdapat keperluan untuk meningkatkan kesedaran pelajar universiti dan meningkatkan tahap kualiti tidur mereka dalam kalangan pelajar sarjana sebagai langkah pencegahan untuk masalah selanjutnya.

Kata kunci: *Tahap kualiti tidur, Aktiviti fizikal, PSQI dan IPAQ, Pelajar sarjana muda*

SLEEP QUALITY AND THE ASSOCIATED FACTORS AMONG UNDERGRADUATE STUDENTS AT HEALTH CAMPUS, UNIVERSITI SAINS MALAYSIA

ABSTRACT

It is acknowledged that sleep quality is frequently worsened in university students. Lack of awareness of the symptoms and early treatment can lead to other diseases. Thus, this study aimed to investigate the sleep quality and associated factors among undergraduate students at Health Campus USM. A total of 250 undergraduate students aged between 19 to 30 years old from the three schools (Health Science, Medicine and Dentistry) were involved in this study. A cross-sectional study design was employed. The Pittsburgh Sleep Quality Index (PSQI) and International Physical Activity Questionnaire (IPAQ) were utilized for data collection. Then the data were analyzed using SPSS version 26. Pearson Chi-Square Test was used to identify the association between socio-demographic characteristics (gender, body mass index, physical activity and sleeping pattern) with sleep quality. The majority of the respondents in this study had a poor level of sleep quality (n=203, 81.2%). Among the four factors, only gender was found to have no significant association with sleep quality (p= 0.071). While the other three factors; body mass index (p= 0.08), physical activity (p= 0.002) and sleeping pattern (p=0.001) have been found significant association with sleep quality. On the other hand, most of the undergraduate students had poor levels of sleep quality and were moderately active (n=98, 39.2%). These findings revealed, there was a need to increase university students' awareness and improve their level of sleep quality among undergraduate students as a preventive measure for further problems such as practicing sleep hygiene and include physical activity in daily routine.

Keywords: *Level of sleep quality, Physical activity, PSQI and IPAQ, Undergraduates student*

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Good sleep quality is a well-known predictor of various physical and mental health conditions. Although researchers and the public widely use it, the expression lacks a defined meaning. Currently, there is no consistent guidance regarding what constitutes optimal sleep quality and what is normal or abnormal sleep quality. Even so, National Sleep Foundation (2015) defines sleep quality as the satisfaction of the sleep experience. It also includes the various aspects of sleep maintenance and sleep quantity. It is recommended that adults get at least 7 to 9 hours of sleep a night. However, the ideal amount of sleep required each night could vary between individuals (Chaput, Dutil & Sampasa-Kanyinga, 2018). Sleep quality and duration can be affected by various factors such as age, lifestyle changes, and technological demands. (Lemma, Gelaye, Berhane & Williams, 2012). New social opportunities with their commitments, difficult studies and other extracurricular activities result in irregular sleep schedules and higher risks for sleep deprivation. Of note, investigators have identified university students as susceptible to these increasing demands.

There is a common perception that university students cannot get enough sleep (Orzech, Salafsky, & Hamilton, 2011). According to reports, university students' sleep level and quality have altered over the last few decades, and sleep problems have increased (Vail-Smith, Felts, & Craig, 2009). According to the findings of related studies, sleeping conditions result in various degrees and patterns among university students (Mayda, Kasap, Yildirim, Yilmaz, Derdiyok, Ertan et al., 2012). Sleep deprivation has a negative impact on academic

performance as well as emotional and behavioural issues (Verlander, Benedict & Hanson, 1999).

According to another study, there is a link between sleep quality and psychological health; university students with poor sleep quality have more psychological problems (Liu, Zhao, Jia & Buysse, 2008). Furthermore, external factors such as gender, academic accomplishment, academic background, general health, socio-economic status, and a person's stress level have been documented in the medical literature to affect sleep quality (Karatay, Bas, Aldemir, Akay, Bayir, Onayli & Orzech, 2016). As a consequence, reflecting the students' sleep quality and the factors that influenced it is definitely more important. Since there is a limitation of related research in Malaysia, there is a demand for this type of study.

It is acknowledged that sleep quality is commonly associated with gender, BMI, sleeping pattern and physical activity. This is proven by the relationship between physical activity and sleep is intersects and poor sleep may also contribute to reduced physical activity (Dolezal et al., 2017). However, a study by Skarpsno et al. (2018) found that the association of heavy physical activity results in fatigue with the risk of sleep problems. Additionally, when the type of physical activity is considered, high occupational physical activity (compared to leisure-time physical activity) may have detrimental effects on physical and mental health, including sleep (Skarpsno et al., 2018 & Cillekens et al., 2020).

Other than that, there are several studies about sleep quality associated with BMI but the results from these studies are inconsistent (Hung H.C., 2013; Vargas P.A., 2014; Fatima Y., 2016 & Peltzer K, 2017). Some studies stated there is a higher risk for poor sleep quality when someone is overweight or obese (Hung H.C., 2013 & Fatima Y., 2016). While data from Eastern countries are limited, and there are insufficient studies about university students (Tu, X., Cai, H., Gao, Y. T., Wu, X., Ji, B. T., Yang, G., et al., 2012). However, one cross-sectional

study in Malaysia stated that overweight-obesity students at university are at a greater risk of having reduced sleep quality with longer sleep latency and frequent sleep disturbances (Nurul Fareeza, Zuriati, Siti Nur 'Asyura et al., 2020). In order to understand the relationship between BMI and sleep quality in students, researcher decided to conduct this cross-sectional study on undergraduate students in Health Campus USM.

Moreover, sleep also can be affected by gender and sleeping pattern. In Germany, research by Schleider and Günter reported that 54.1% of university students experienced sleep deprivation and poor sleep quality. Students with poor grades neglect their sleep at night to do revision in order to improve their grades. If this situation is prolonged, it will affect students' sleep quality and mental health. Sleep quality and duration is affected by factors such as age, gender, and lifestyle (Oluwole, 2010 & Lund et al., 2010). Besides, it is stated in the literature that, sleep quality can be influenced by external factors such as gender (Karatay, Bas, Aldemir, Akay, Bayir, Onayli & Orzech, 2016). This statement is supported by the correlation between gender and sleep quality which females have lower sleep quality than males (Orzech et al., 2011 & Aysan, Karakose, Zaybak & Ismailoglu, 2014). Thus, the researcher would like to investigate the relationship between genders and sleep pattern with sleep quality among undergraduate students at Health campus USM.

Sleep quality has significant effects on cognitive performance and health. It is recommended that adults get at least 7 to 9 hours of sleep a night to ensure the sleep quality. Contrary to popular belief, university students tend to suffer from stress and sleep deprivation when they should be achieving the most learning (Ahrberg, Dresler, Niedermaier, Steiger & Genzel, 2012). Hence, improved sleep quality will likely benefit university students in their mental health status, daily activities and academic performance (Lemma et al., 2012). Due to the conflicting results of previous studies, we believe that further investigation is needed to examine the link between associated factors and overall sleep quality. Through this study,

researcher can learn about the factors that affect sleep quality and develop treatment plans that can improve it.

1.2 Problem Statement

It is acknowledged that sleep quality is frequently worsen in university students. This proven by the increasing school; family, social pressure and environmental issues among adolescents indirectly lead to a delay of sleep timing together with the change in the intrinsic regulation of both circadian and homeostatic processes (Appanna & Kesintha, 2017). Students face several situations and environments. They have to handle emotion, a new circle of friends, academic workload and an increase in responsibilities (Taylor, Bramoweth, Grieser, Tatum & Roane, 2013). These special circumstances faced by university students could affect their sleep quality. About 60% suffer from poor sleep quality according to the PSQI (Lund, Reider, Whiting & Prichard, 2010). Thus, this can significantly affect students' sleep patterns. In Malaysia, there are few studies that found high statistics of poor sleep quality among university students (Tien et al., 2017; Nurismadiana & Lee, 2018 & Nurul Najihah, Siew, Guat & Nur Aizati, 2021).

However, the association between poor sleep quality with body mass index, physical activity and sleeping pattern remain inconclusive. Several local studies were conducted among university students in Malaysia but the association is still inconsistent (Lai & Say, 2013; Ganesh Kamath et al., 2014 & Kumar, Othman & Jeppu, 2020). While a study done by Nurismadiana et al. (2018) found that a total of poor sleep quality among undergraduate students was 70.6%. According to the same study, 35.5% of students had poor sleep quality and 55.3% of those were female (Nurismadiana et al., 2018). Another study involving undergraduate pharmacy students in Universiti Sains Malaysia showed that 84% (n = 215) of

them experienced poor sleep quality (Nurul Najihah et al., 2021). Therefore, it stimulated the researcher to investigate the sleep quality and associated factors among undergraduate students at Health Campus USM.

Most of the study on sleep quality were conducted in the Western countries. Such study is rather scanty in Malaysia. The researcher only managed to find a few local published studies on sleep quality with the same associated factors (Lai et al., 2013; Roshini, 2015; Nurismadiana et al., 2018; Nurul Fareeza et al., 2020; Saat et al., 2021 & Nurul et al., 2021). Most of the studies investigated the factors that affect the sleep quality among students and elderly associated with psychological factors or sleep disorders.

There are also four studies conducted in USM that assessing sleep quality among elderly and hospitalized patients and the sleep quality and coping styles among students (Syazwani, 2011; Noor Farhani, 2016; Soh, 2018 & Syahirah, 2020). However, sleep quality and the associated factors among undergraduate students is not well characterized so far. The researcher also experienced poor sleep quality during the clinical period. Hence, this personal experience may provide ideas to identify the associated factors that can influence sleep quality among university students which could be used to improve the level of sleep quality among undergraduate students at Health Campus USM. All of these issues have inspired the researcher to conduct a study on sleep quality and the associated factors among university students in Malaysia.

1.3 Research Questions

1. What is the level of sleep quality among undergraduate students in Health Campus, Universiti Sains Malaysia?

2. Is there any association between sociodemographic factors and sleep quality among undergraduate students in Health Campus, Universiti Sains Malaysia?

1.4 Research Objectives

1.4.1 General Objective

To assess sleep quality and factor associated with sleep quality among undergraduate students in Health Campus, Universiti Sains Malaysia.

1.4.2 Specific Objectives

1. To identify the level of sleep quality among undergraduate students in Health Campus, Universiti Sains Malaysia.
2. To determine the significant association between sociodemographic factors and sleep quality among undergraduate students in Health Campus, Universiti Sains Malaysia.

1.5 Research Hypothesis

Ho: There is no significant association between sociodemographic factors and sleep quality among undergraduate students in Health Campus, Universiti Sains Malaysia.

HΔ: There is a significant association between sociodemographic factors and sleep quality among undergraduate students in Health Campus, Universiti Sains Malaysia.

1.6 Significance of the Study

The finding of this research provided baseline information about the sociodemographic factors experienced by the undergraduate students in USM Health Campus and their level of sleep quality. The finding also can be used to emphasize the needs of nursing intervention to help the students to have an adequate sleep. This is because good quality of sleep promotes a better health and good academic performance.

1.7 Conceptual and Operational Definitions

Table 1: Conceptual and operational definitions.

Terms	Conceptual	Operational
Sleep quality	National Sleep Foundation (2015) defines sleep quality as the satisfaction of the sleep experience. It also includes the various aspects of sleep maintenance and sleep quantity.	In this study, sleep quality is refer to the quality of sleep among undergraduate students by using Pittsburgh Sleep Quality Index (PSQI).

Undergraduate students	According to Collins Dictionary, an undergraduate student is a student at a university or college who is studying for his or her first degree.	In this study, the term of undergraduate student refers to someone who pursue a bachelor's degree in USM Health Campus.
Physical activity	Referring to Collins Dictionary, physical activities is an actions, or things are connected with a person's body.	In this study, physical activity involving vigorous and moderate activities, walking, and sitting by using the International Physical Activity Questionnaire (Short) IPAQ in categories (low, moderate or high activity levels).

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed the current literature related to sleep quality in terms of sleeping disorders, the factors of sleep quality and sleep quality among students. The literature search was done by using main keywords sleep quality, university students, gender, body mass index, physical activity and sleep pattern. This chapter also discussed the theoretical framework that was used in this study.

2.2 Sleep Quality

Sleep is a vital component of our bodies' natural systems. It plays a leading role in the development and maintenance of optimal health (Medic, Wille, & Hemels, 2017). The primary function of sleep is to reduce the body's energy demands (Brinkman, Reddy & Sharma, 2021). The concept of sleep supported by the fact that it allows the body to repair and renew its cellular components, which are needed to maintain the biological functions that are depleted during the day. This theory also states that sleeping allows the body to generate new proteins and chemicals that needed for growth.

There are four sleep stages; rapid eye movement (REM) sleep and three-stage in non- REM (NREM) sleep. These sleep stages were updated by the American Academy of Sleep Medicine in 2007. NREM sleep is composed of three different stages. The higher the stage of sleep, the harder it is for a person to wake up from their slumber. Stage 1 is the “doze off” stage, and it only lasts just one to five minutes. The body is not fully relaxed during this sleep stage. There

are also periods of brief movements known as witches, which can slow down brain activities. Getting up from sleep can be very challenging since it can trigger light changes in the brain.

During stage 2, the body's temperature drops, and it slows down its breathing and heart rate. The brain waves also change. These changes can help resist being awakened by an external stimulus. Next, stage 3 is a type of deep sleep that considered slow-wave sleep. It is when the brain's activity levels decrease as the body relaxes further. This process, which known as delta waves, can help improve a person's mental and physical health. During this time, the brain's activity increases, which is similar to the levels seen when you are awake. The body also experiences atonia, which occurs when the muscles that control breathing stop working. When sleeping, it is normal not enter a REM stage until after 90 minutes of sleep. However, as the night goes on, this process can last for around an hour.

2.3 Students' Sleep Quality

Students' sleep quality is very important for their academic performance. It plays a critical role in memory consolidation (Okano, Kaczmarzyk, Dave et al., 2019). The lack of sleep can affect a student's academic performance and physical health (Maheshwari & Shaukat, 2019). According to Carskadon and Wolfson (2003), a poor sleeping habit increases the risk of having a poor grade on academic performance. A study by Wolfson and Carskadon (1998) showed that higher grades provided more total sleep and earlier bedtimes. Moreover, factors that regulate sleep and wake up time are influenced by the environment (Mirghani, Mohammed, Almurtadha et al., 2015).

In 2010, Steven and Cameron found a negative correlation between global and academic performance. They found that lower sleep quality was linked to lower academic performance.

Overall, better quality, longer duration, and greater consistency of sleep correlated with better grades (Okano et al., 2019). According to Franklin, Walter & Barlow (2002), university students tend to get too much sleep during weekends and insufficient sleep during the weekdays. This habit occurs when the regular workday times and non-school days coincide with the later wake-up times that can lead to poor academic performance and job performance (Franklin et al., 2002).

Sleep deprivation is known to have detrimental effects on cognitive function. Unfortunately, most of university students did not notice the sleep deprivation could influences their cognitive functioning. In 1997, Walters and Pilcher discovered that students who spent all night before exams performed better than those who slept 8 hours. However, they said the pull nighter performance was actually much worse and give negative effect towards their health and academic performance. The prevalence and implications of sleep difficulties warrant further exploration into underlying factors that contribute to such problems.

2.4 Associated factors and sleep quality

2.4.1 Gender

Unsal and Demir (2012) stated that sleep quality could be affected by gender. They mentioned that females would have poorer sleep quality than males. A Japanese research said that the prevalence of sleep disorder was higher among female (31.1%) than male, which is only 26.4% (Tang, Liao, Kelly, Xie, Xiang, Qi, Pan, Hao, Liu, Zhang & Chen, 2017). This may be due to male mostly enjoy their leisure time and experience less stress than female (Burgard & Ailshire, 2013). Lin, Davidson and Ancoli-Israel (2008) added to this as hormonal change and it was correlated with severity of sleep disorder among female. However, Wali, Abalkhail

and Krayem (2017) found that there was higher prevalence of sleep disorder in male population than female.

There was a study that mentioned sleep quality was associated with gender, year of study, type of accommodation, and sleep hygiene among students in Hong Kong (Suen et al, 2010). Second, the result of the association between sleep quality and gender in this study also showed no significant relationship between the variables (Aung, 2016). This finding was similar to one of the previous study that claimed that there was no correlation between genders and sleep quality (Lemma et al., 2013). However, there was an association between sleep quality and gender since the results proved female students often had poor sleep quality (Ming, Koransky, Kang, Buchman, Sarris & Wagner, 2011).

2.4.2 Body Mass Index (BMI)

In Malaysia, adult obesity has become a major issue, with around half of the country's population having a body mass index of more than 25kg/m2 (IPH, 2019). The prevalence of overweight-obese among Malaysians aged 18 years old has been increasing over the years. This is evidenced by the National Health and Morbidity Survey's (NHMS) findings, which showed increasing trends in the prevalence of obesity from 29.1% and 14.5% in 2006 (IPH, 2008) to 30.0% and 17.7% in 2015 (IPH, 2015), and the latest to 30.4% and 19.7% (IPH, 2019).

In a meta-analysis aimed to examine the association between poor sleep quality with overweight-obese, higher odds of being overweight-obese were observed among respondents with poor sleep quality (Fatima, Doi, Najman & Mamun, 2016). This is in agreement with a study involving 2100 undergraduates that showed poor sleep quality was associated with a higher likelihood of being overweight-obese (Kristicevic, Štefan & Sporiš, 2018).

Inadequate sleep duration is a modifiable behaviour linked with body weight, yet limited is known on the role of sleep quality with body weight status among university students (Nurul, Zuriati, Siti & Sabariah, 2020). Findings suggest that overweight and obese students at university are at a greater risk of having reduced sleep quality with longer sleep latency and frequent sleep disturbances (Nurul et al., 2020).

Studies in Malaysia revealed that many students have poor sleep quality (Tien, Masalamany, Abd Manan & Adam, 2017). However, the link between sleep quality and body weight remains unclear. There are so many studies conducted among Malaysian students at universities but did not find significant associations (Kumar et al., 2020). Thus, this study targeted to determine sleep quality and the association with body mass index among university students.

2.4.3 Physical Activity

Regular exercise actually give benefits to one's sleep quality. Doing physical activity helps improve sleep quality and total sleep time. It can also cause sleep onset latency and reduce it a bit (Arbinaga, Fernández-Cuenca, Fernández-Ozcorta, Toscano-Hermoso & Joaquin-Mingorance, 2019). Effects of moderate physical activity vary depending on several factors, including age, gender, and level of exercise. They can also be moderate if done at the right time and duration (Kredlow, Capozzoli, Hearon, Calkins & Otto, 2015).

People with low levels of sedentary behaviour and a high level of physical activity have better sleep efficiency than those who are inactive (Gubelman, Heinzer, Haba-Rubio, Vollenweider & Marques-Vidal, 2018). Between 40 and 50% of university, students are physically inactive, with women being less active than men (Lang, Brand, Feldmeth, Holsboer-

Trachsler, Pühse & Gerber, 2013). It reported that university students with a high level of physical activity have a 49% lower risk of showing poor sleep quality (Feng, Zhang, Du, Ye & He, 2014).

The physical activity led to a restful night's sleep (Saat, Hanawi, Farah, Mohd Amin, Hanafiah & Selvaraj, 2021). A study conducted in Saudi Arabia revealed that physical activity and sleep quality are linked. According to the same study, 68.5% of sedentary students had poor sleep quality (Mahfouz, Ali, Bahari, Ajeebi, Sabei, Somaily, Madkhali, Hrooby & Shook, 2020). Another research of university student in China found that increased physical activity and less time spent on devices reduced the likelihood of poor sleep quality (Feng et al., 2014). A study conducted in Spain revealed that students who do not exercise regularly are twice as likely to suffer from poor sleep quality (Arbinaga et al., 2019).

This study revealed that being active has positive effects on a person's mood and sleep quality. It found that being active led to better sleeping habits (Al Khatib, 2014; Ströhle, 2009). Interestingly, the present study indicated that more poor sleepers were among the students who were physically active. Thus, this study conducted to extend our knowledge about the link between sleep quality and student physical activity levels. We suggest that the inactive participants take the same test to evaluate their sleep quality (Arbinaga et al., 2019). This study could help university administrators encourage students to participate in physical exercise (Saat et al., 2021).

2.4.4 Sleep pattern and behaviour

It is recommended for adults to have seven to nine hours of sleep per night for optimum recovery (National Sleep Foundation, 2015). Pilcher and Huffcutt (1996) defined sleep

deprivation as functioning with less than five hours of sleep from the previous night. It was also found that academic workload had a significant association with sleep patterns. Lund, Reider, Whiting and Prichard (2010) showed a high correlation between academic stress and sleep quality. A previous study assessing the sleep-wake pattern of medical students has been conducted (Medeiros & Araujo, 2002), which showed that time of class initiation in the morning affected the students' sleep-wake pattern and directly influenced their sleep quality.

About 42.3% of the students had poor sleep quality when they had an early schedule. Subsequently, the prevalence decreased to 11.5% of students when they had later scheduled. Furthermore, if the class is in the evening, students had a longer sleep duration and better sleep quality compared to morning class (Tien et al., 2017). Most of the students tend to stay up late into the night to accomplish their tasks as they did their best to prepare for a competitive future and as a result, they forgo getting enough sleep (Williamson, 2015). Changes in sleeping patterns may affect one's sleep quality later on. Then, it will impair the ability of the students to pay attention in classes and cause excessive daytime sleepiness (Chiang, 2013; Harlina, Abdus, Raihanah, Nurul, Tan & Muhammad, 2013). This is because a poor sleeping habit can affect neurobehavioral function. It can also lead to an increase in sleep fragmentation.

Although napping is considered a slightly unhealthy but a study showed that it could bring many benefits such as improving mood and reducing fatigue. Getting short breaks can also help improve cognitive performance (WebMD, 2020). A quick afternoon nap is usually harmless, it could cause long-term health issues if it becomes a habit (Suzzanah, 2016). Getting too much sleep can affect one's health. Long naps can increase risk of developing certain health conditions like diabetes and high blood pressure. While brief naps may improve your cognitive functioning, they can also have the opposite effect. For instance, if one sleep for more than an hour, they may experience sleep inertia.

2.5 Theoretical and Conceptual Framework of the Study

2.5.1 Theoretical Framework

This study utilized the Spielman's Three-Factor Insomnia Model. According to Ae and Jinyi (2016), this model proposes the interactions among predisposing, precipitating, and perpetuating factors of insomnia. The Three-Factor Insomnia Model describes the interactions among the various factors that trigger sleep disturbances. These include stress and behavioural factors. People with insomnia may experience episodes of insomnia due to a variety of factors that can lead to precipitating factors. While the perpetuating factors are behaviours used to compensate for the loss of sleep. Therefore, this model was used to examine the levels of sleep quality among respondents using Spielman's 3P biobehavioral model as a theoretical framework, and determine how sociodemographic characteristics, predisposing factors, precipitating factors, and perpetuating factors affect young adults' sleep quality.

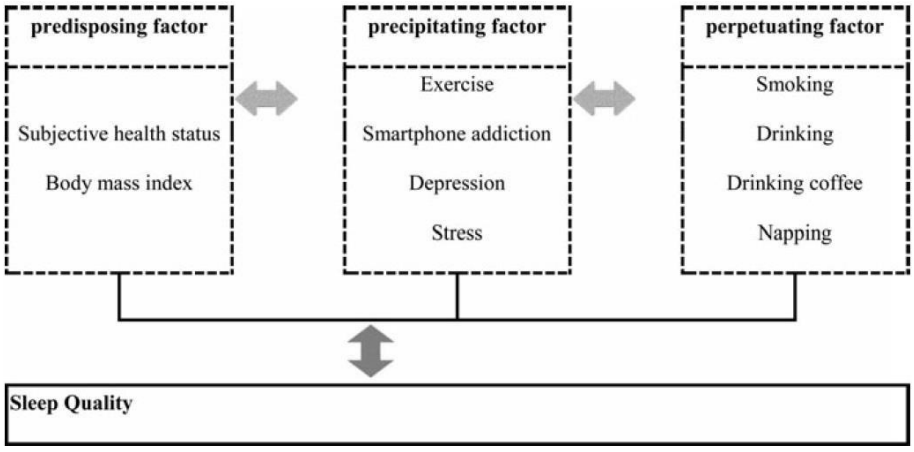


Figure 2.1: Adapted from Predictors of Sleep Quality among Young Adults in Korea: Gender Differences by Ae Kyung Chang & Jinyi Choi PhD (2016).

2.5.2 Conceptual Framework

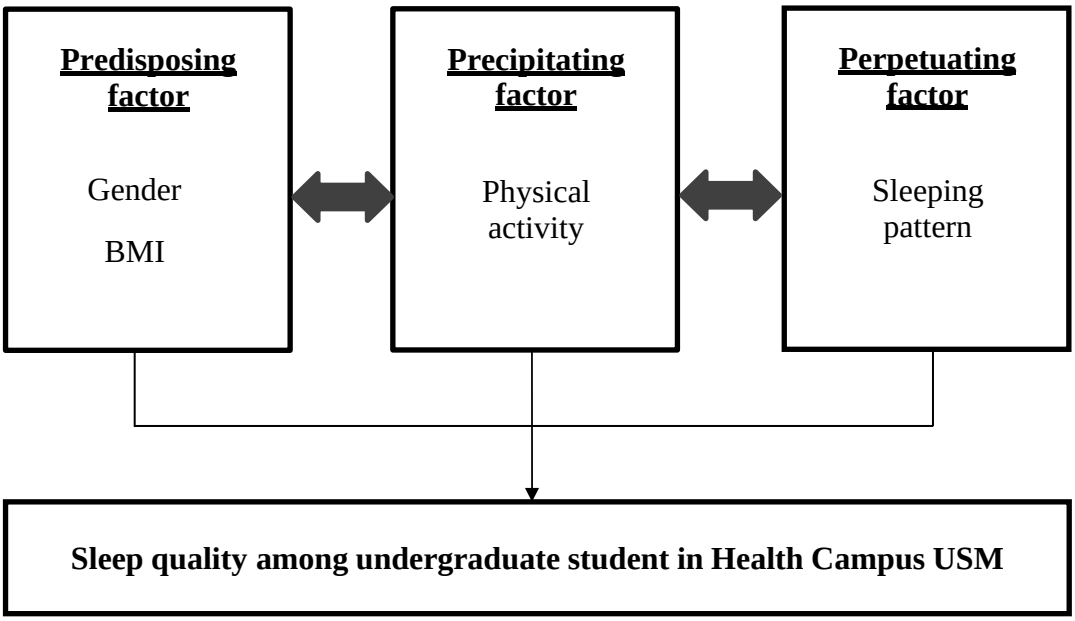


Figure 2.2 Conceptual framework associated factors and sleep quality.

CHAPTER 3

METHODOLOGY AND METHODS

3.1 Introduction

This chapter explained and justified the approach and rationale used to support the chosen research methodology. Achieving the purpose of the study requires understanding and correct determination of a suitable research design. This chapter started with explanation and justification of cross-sectional study design that has been applied in this study. Then, the chapter continued with description of study setting and population, sampling plan that included participant selection criteria, sampling method and sample size determination, instrumentation and ethical consideration in this study through right data collection. The final section in this chapter explained the proposed statistical analyses used with the quantitative data.

3.2 Research Design

A cross-sectional study was carried out among undergraduate students in Health Campus, Universiti Sains Malaysia located in the north-east coast peninsular Malaysia. In cross-sectional study design, data was collected from the study population at a single point in time (Public Health Action Support Team, 2017). This enable the examination of the relationship between sleep quality and the variables of interest.

3.3 Study Setting and Population

This study conducted in USM Health Campus Kubang Kerian, Kelantan among the undergraduate students in USM Health Campus. This study has been carried out from October 2021 until July 2022.

3.4 Sampling Plan

Sampling is the process that used in statistical analysis to select respondents from a large population. Sampling ensured that the sample chosen represented the population being studied, ensuring validity and reliability of study and reducing measuring errors.

3.4.1 Sampling Criteria

The subject of this study were among the undergraduate students in USM who fulfilled the inclusion criteria. In Malaysia, undergraduate was referring to those who pursue the bachelor's degree. The inclusion and the exclusion criteria for the respondents of this study are as the following:

Table 3: The inclusion and the exclusion criteria for the respondents of this study.

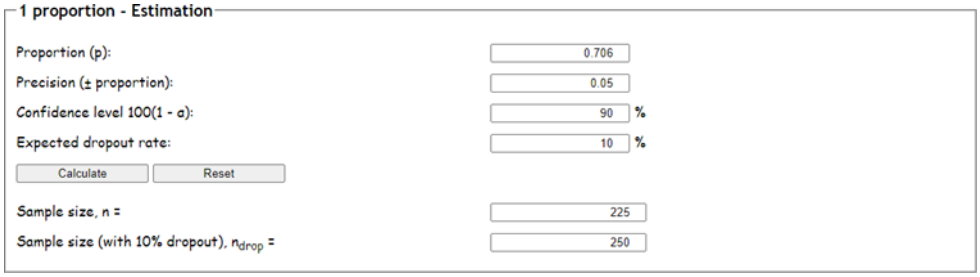
Inclusion criteria	Exclusion criteria
1. Male and female undergraduate students 2. Age between 19 – 30 3. Studied in USM Health Campus	1. Diploma student 2. Having mental health problem

3.4.2 Sampling Size Estimation

The sample size was calculated for both objectives using Sample Size Calculator (web) by Wan Nor Arifin (2015). The reasonable sample size was taken as the study sample size.

Objective number one was calculated using single proportion formula and the proportion data taken based on previous study conducted by Nurismadiana et al., (2018).

$$\mathbf{n = (z/\Delta)^2\ p(1\text{-}p)}$$



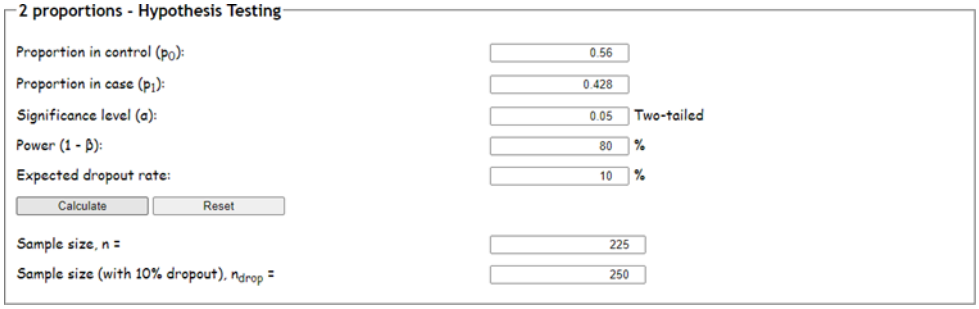
The minimal sample size was 225 and after considering 10% drop out, the calculated sample size was 250.

n = 250 respondents

Objective number two is calculated using double proportion formula and the proportion data taken based on previous study.

$$\mathbf{n} = \frac{p_1(1-p_1) + p_2(1-p_2)}{(p_1-p_2)^2}\,(z_\alpha - z_\beta)^2$$

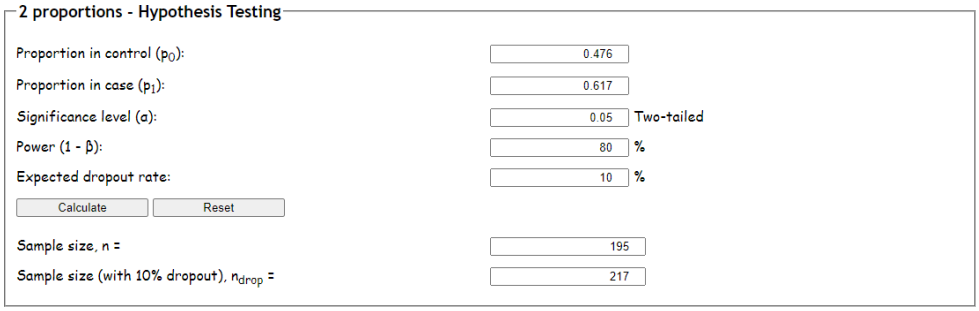
The data of association of gender and poor sleep quality among undergraduate students was taken from previous study in by Abdallah et al. (2021); p1 = 56%; p2 = 42.8%.



Therefore, the minimal sample size was 225 and after considering 10% drop out, the calculated sample size was 250.

n = 250 respondents

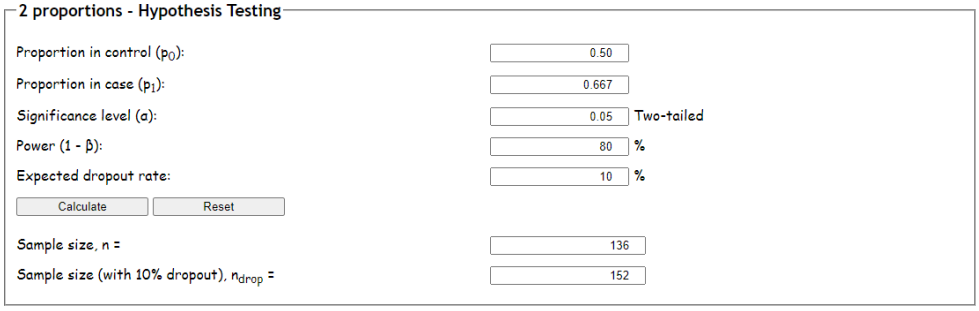
The data of association of BMI and poor sleep quality among undergraduate students was taken from previous study by Nurul Fareeza et al. (2020); p1 = 47.6%; p2 = 61.7 %.



Therefore, the minimal sample size was 195 and after considering 10% drop out, the calculated sample size was 217.

n = 217 respondents

The data of association of physical activity and poor sleep quality among undergraduate students was taken from previous study by Saat et al. (2021); p1 = 50%; p2 = 66.7 %.



Therefore, the minimal sample size was 136 and after considering 10% drop out, the calculated sample size was 152.

n = 152 respondents

Based on the calculations from each objectives, the biggest sample size is 250. Therefore, the total sample size needed for this study is 250 samples.

3.4.3 Sampling Method

This study used systematic random sampling method for collection data among the undergraduate students in USM Health Campus. A list of undergraduate students in all school of Health Campus, USM obtained separately from the school academic administration office. Following, each member of the larger population group assigned a number using Excel. The list of students' names in alphabetical order was coded. Next, the researcher will the find the interval by dividing the total population with the sample size of study using the formula k=N/n which k is systematic sampling interval, N is population size while n is sample size. The researcher will use random number generator to pick which number to begin with.

3.5 Instrumentation

The questionnaire was self-administered online and contained four sections A, B, C and D. Section A was designed to collect the undergraduate students' socio-demographic data (age, gender, ethnicity, accommodation, year of study, school of study and BMI). Section B contains four questions: usual bed time, how long it take to fall asleep, usual getting up time and total hours sleep at night. Section C was determined to know students' sleeping pattern. Section D focus on physical activity level. The PSQI questionnaire was adapted from Buysse et al. (1989) and need to complete the request form for permission to use any of the instruments. Hence, a proper citation is needed the reference for the PSQI in any publications. For the subjects' physical activity was assessed using the International Physical Activity Questionnaire (Short) (IPAQ). This questionnaire is publically available, it is open access, and no permissions are required to use it. The questionnaire is aimed to be culturally adaptable and has been translated into a number of languages such that conceptual, metric and linguistic equivalence is maximised.

3.5.1 Pittsburgh Sleep Quality Index (PSQI)

The PSQI, which a self-rated questionnaire that assesses sleep quality and disturbances over an l-month time interval. Hence, researcher applied this questionnaire just for over a 1-week time interval. This section contains 19 self-rated questions and 5 questions rated by the bed partner or roommate (if one is available). Only self-rated questions are included in the scoring. The 19 self-rated items are combined to form seven "component" scores, each of which has a range of 0-3 points. In all cases, a score of "0" indicates no difficulty while a score of "3" indicates severe difficulty. The seven component scores are then added to yield one "global"

score with a range of 0-21 points, “0” indicating no difficulty and “21” indicating severe difficulties in all areas. The lower scores denote healthier sleep quality.

3.5.2 Physical Activity Level

The IPAQ. It consists of 27 items across 5 sections covering different types and domains of physical activity and sitting behaviours. But the researcher decided to include 3 sections only: transportation physical activity, recreation, sport and leisure-time physical activity and time spent sitting because it is more suitable with the study. The IPAQ scoring expressed as MET level times by minutes of activity per day times by days per week. The MET levels are according to:

- Walking = 3.3 METs
- Moderate intensity = 4.0 METs
- Vigorous intensity = 8.0 METs

Total MET-minutes/week = Walk (METs*min*days) + Moderate (METs*min*days) + Vigorous (METs*min*days)

But then, the levels of physical activity are proposed into three category; low, moderate and high. For the moderately active, the respondents should at least achieving 600 MET-minutes per week. Next for the vigorously active, the respondents should accumulating at least 3000 MET-minutes per week. Thus, for those who not achieve the criteria’s either moderate or vigorous, they were considered as low activity respondents.