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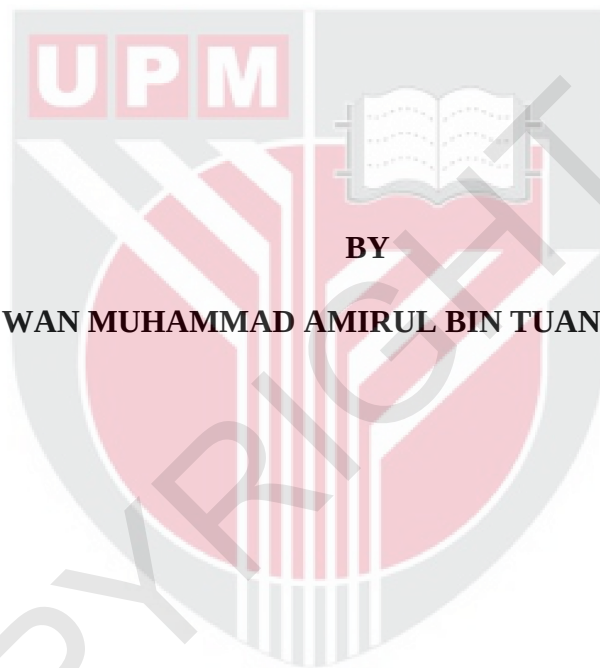
***STRESS AND SLEEP QUALITY AMONG NURSING STUDENTS
IN MALAYSIA***

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STRESS AND SLEEP QUALITY AMONG NURSING STUDENTS

IN MALAYSIA



BY

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**Thesis submitted in fulfilment of the requirement for the degree of Bachelor of
Science in Environmental and Occupational Health with Honours from the
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ABSTRACT

STRESS AND SLEEP QUALITY AMONG NURSING STUDENTS IN MALAYSIA

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Introduction: Stress and poor sleep quality had been a significant problem globally. However, there were inadequate insight on the sleep quality among nursing students in Malaysia. Considering their erratic work hours from practical, heavy academic workloads and academic performance, they were susceptible to experiencing stress and poor sleep quality which lead to poor academic performance, poor health behaviours affecting sleep quality while poor sleep quality would lead to impaired cognitive functioning and decrease in quality of life. **Objectives:** This study aimed to determine the predictors associated with poor sleep quality among nursing students in Malaysia. **Methodology:** This was a cross-sectional study conducted among nursing students in Malaysia. This study utilized online questionnaire which consists of five sections including socio-demographic background, academic performance, lifestyle factors, Perceived Stress Scale (PSS-10) and Pittsburgh Sleep Quality Index (PSQI). **Results:** A total of 339 nursing students participate in this study. The prevalence of poor sleep quality was 72.9%. Based on Chi-Square result, there was a significant association between poor sleep quality and credit hour taken ($\chi^2=6.416$, $p=0.011$), caffeine intake ($\chi^2=9.684$, $p=0.002$) and total stress score ($\chi^2=15.841$, $p<0.001$). From multiple logistic regression, there were only 2 predictors found which were caffeine intake (OR=0.354, 95% CI=0.172, 0.732, $p=0.005$) and total stress score (OR=9.542, 95% CI=2.640, 34.488, $p=0.001$). **Discussion:** The prevalence of poor sleep quality was not directly comparable to local studies due to different population which was medical students. Also, it was higher compared to international studies. Furthermore, there was a possibility that the respondents' stress level and sleep quality could had been exacerbated by covid-19 situation. **Conclusion:** The results showed that majority of nursing students had poor sleep quality. The authority must conduct intervention program to improve the sleep quality of nursing students in Malaysia.

Keywords: nursing students, sleep quality, stress, lifestyle factors, academic performance

ABSTRAK

STRES DAN KUALITI TIDUR DALAM KALANGAN PELAJAR KEJURURAWATAN DI MALAYSIA

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Pengenalan: Stres dan kualiti tidur yang buruk telah menjadi masalah penting di seluruh dunia. Walau bagaimanapun, terdapat pandangan yang tidak mencukupi tentang kualiti tidur dalam kalangan pelajar kejururawatan di Malaysia. Memandangkan waktu kerja mereka yang tidak menentu daripada praktikal, beban kerja akademik yang berat dan prestasi akademik, mereka terdedah kepada stres dan kualiti tidur yang buruk yang membawa kepada prestasi akademik yang teruk, tingkah laku kesihatan yang teruk menjejaskan kualiti tidur manakala kualiti tidur yang teruk akan menyebabkan fungsi kognitif terjejas dan penurunan dalam kualiti hidup. **Objektif:** Kajian ini bertujuan untuk menentukan peramal yang dikaitkan dengan kualiti tidur yang buruk dalam kalangan pelajar kejururawatan di Malaysia. **Metodologi:** Ini adalah kajian keratan rentas yang dijalankan dalam kalangan pelajar kejururawatan di Malaysia. Kajian ini menggunakan soal selidik dalam talian yang terdiri daripada lima bahagian termasuk latar belakang sosio-demografi, prestasi akademik, faktor gaya hidup, Persepsi Skala Stres (PSS-10) dan Indeks Kualiti Tidur Pittsburgh (PSQI). **Keputusan:** Seramai 339 pelajar kejururawatan mengambil bahagian dalam kajian ini. Kelaziman kualiti tidur yang buruk ialah 72.9%. Berdasarkan keputusan Chi-Square, terdapat hubungan yang signifikan antara kualiti tidur yang buruk dan jam kredit yang diambil ($\chi^2=6.416$, $p=0.011$), pengambilan kafein ($\chi^2=9.684$, $p=0.002$) dan jumlah skor stres ($\chi^2=15.841$, $p<0.001$). Daripada regresi logistik berganda, hanya terdapat 2 peramal yang ditemui iaitu pengambilan kafein (OR=0.354, 95% CI=0.172, 0.732, $p=0.005$) dan jumlah skor stres (OR=9.542, 95% CI=2.640, 34.488, $p=0.001$). **Perbincangan:** Kelaziman kualiti tidur yang buruk tidak dapat dibandingkan secara langsung dengan kajian tempatan kerana populasi yang berbeza iaitu pelajar perubatan. Juga, ia lebih tinggi berbanding dengan kajian antarabangsa. Tambahan pula, terdapat kemungkinan tahap stress dan kualiti tidur responden boleh diburukkan lagi oleh situasi covid-19. **Kesimpulan:** Keputusan menunjukkan bahawa majoriti pelajar kejururawatan mempunyai kualiti tidur yang buruk. Pihak berkuasa mesti menjalankan program intervensi untuk meningkatkan kualiti tidur dalam kalangan pelajar kejururawatan di Malaysia.

Kata kunci: pelajar kejururawatan, kualiti tidur, stres, faktor gaya hidup, prestasi akademik

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LIST OF ABBREVIATIONS

CGPA	Cumulative Grade Point Average
COVID-19	Coronavirus Disease 2019
CSSQ	COVID-19 Student Stress Questionnaire
DASS	Depression Anxiety Stress Scale
ESS	Epworth Sleepiness Scale
ESS-CHAD	Epworth Sleepiness Scale for Children and Adolescent
IQR	Interquartile Range
ISI	Insomnia Severity Index
JKEUPM	Ethic Committee for Research Involving Human Subjects of Universiti Putra Malaysia
JSS	Jenkins Sleep Scale
MAHSA	Malaysian Allied Health Sciences Academy
MQA	Malaysian Qualification Agency
MSQ	Mini Sleep Questionnaire
PSQI	Pittsburgh Sleep Quality Index
PSS	Perceived Stress Scale
REM	Rapid Eye Movement
RLS	Restless Legs Syndrome
SPSS	Statistical Package for the Social Sciences
SSS	Standard Stress Scale
UKM	Universiti Kebangsaan Malaysia
UPM	Universiti Putra Malaysia
US	United States

CHAPTER 1

INTRODUCTION

1.1 Background of study

Nurses are now considered as one of the most in demand profession globally. Primarily significant in healthcare setting, nurses are not just assistants to the doctors but had a broad range of roles in caretaking of the patients. Other setup beyond a formal healthcare institution (such as in hospital or clinics) which the nurses may find an opportunity are private practices such as in nursing home, private caretaker, industries, research facilities, etc.

Nurses are rigorously trained by curriculum set by the universities to provide them with essential hard skills and soft skills in performing their work tasks. This includes not only technical skills in performing diagnostic test, operating medical equipment, etc. but also essential soft skills such as effective communication skills, critical thinking skills and organizational skills to allow them to carry out their tasks and perform their duties effectively and efficiently.

Currently there are many universities that offer nursing course in Malaysia which consists of public and private universities. Based on record in Malaysia Qualification

Agency (MQA) website, there are currently 57 accredited institutions offering nursing programme at all levels of qualifications starting from certificate to the postgraduate level. Similar to medical doctors, the nurses are also sub-divided into various sub-fields in medicine; namely, pediatrics, obstetrics and gynecology, geriatrics, ear, nose and throat, accident & emergency, oncology, ophthalmology, etc. Nursing students are exposed to the basic but specific duties, roles, and responsibility of each of the expertise.

In general, a nursing student is no different than the usual universities students where they are required to attend classes-lectures, field visits, carry out assignments, being involved with co-curricular activities, etc. However, due to the nature of their occupation, it is expected that the field practical or clinical training are more extensively comprehensive in order to ensure competency when they graduate.

1.2 Problem statement

Nowadays, many countries including Malaysia have an increasing trend of stress as well as poor sleep quality especially among nursing students. According to Zhang et al, (2017), nursing students are more susceptible to poor sleep and mental health as a result of accumulating stress from multiple sources, particularly when they are unable to cope effectively. This has been proven by several studies that reported on higher prevalence of stress and sleep quality among nursing students. For instance, Rathnayake & Ekanayaka, (2016) reported that 82.6% of nursing students are having

stress in a public university in Sri Lanka. Meanwhile, in Turkey, a study at a public university by Yildirim et al. (2020) reported that 77.1% have poor sleep quality.

According to Silva et al. (2016), nursing students generally have an irregular sleep schedule marked by different start and end times especially during weekends. The sleeping time of nursing students also have been affected by higher education, resulting poor sleep quality. Plus, nursing students have to attend for preliminary training during their studies. This will trigger the stress among them and it will affect their sleep quality. As the consequences, there are some students may have not been able to cope the syllabus very well especially when they are in their last year.

The previous study has reported that stress contribute to various negative health impacts. Stress also could lead to poor academic result as well as poor sleep quality. This is because they have busy schedule and need to manage their time for class, study and clinical practicum (Zhang et al., 2018). Many studies on sleep quality have focused and received much attention on medical students at the university levels as compared to nursing students. The prevalence of poor sleep quality among nursing students from other countries such as Korea, Portugal, Spain and Turkey ranged between 60% and 70%. In Malaysia, research on sleep quality has widely focused on medical students. However, there is no study on sleep quality found among nursing students in Malaysia.

Since poor sleep quality among nursing students in worldwide have been highly reported, it is therefore crucial to understand the prevalence and predictors of poor sleep quality among nursing students in Malaysia. In previous studies, the lack of sleep has been shown to cause both physical and mental illnesses. Heart disease, digestive complications and high blood pressure are the examples of physical illnesses while mental illnesses include depression and anxiety (Park et al., 2019). Extensively, cognitive function can also be affected by insufficient sleep leading to poor judgement, agitation, irritability and inability to process information (Maheshwari & Shaukat, 2019). These effects will in turn affect nursing students' academic performance as well as reduction in work productivity (Silva et al., 2016).

1.3 Study justification

The justification of this research study is to establish a future reference for researchers, scholars and students who wish to conduct research in the same or a related field. This due to the lack of reference of stress and sleep quality among nursing students. Aside from that, this research aims to provide awareness on the high level of stress and its effect towards sleep quality among nursing students. Therefore, the mental health of nursing students can be protected. This study also indeed can fill the research gap on the issue of stress and sleep quality among nursing students due to the lack of reference on this population, especially in Malaysia. Furthermore, the nursing students will be future health care assistants for community. They will play a significant role to the community in guiding them to have good lifestyle and avoid from getting health problems especially due to high level of stress.

Therefore, it is important to study the relation of stress and sleep quality of nursing students since many people overlooked this issue. This study hopes to be able to act as a reference for more detailed study in the future.

1.4 Research questions

1. What is the level of stress among nursing students?
2. How is the sleep quality among nursing students?
3. Is there any association between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality among nursing students?
4. What are the factors associated with stress and sleep quality among nursing students?

1.5 Objectives

1.5.1 General objective

To determine the predictors associated with sleep quality among nursing students in Malaysia.

1.5.2 Specific objectives

The specific objectives of this study are:

1. To determine socio-demographic background, academic performance, lifestyle factors and stress among nursing students
2. To determine the prevalence of sleep quality among nursing students
3. To determine the association between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality among nursing students
4. To determine the predictors associated with sleep quality among nursing students

1.6 Hypothesis

1. There is a significant association between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality among nursing students.
2. Socio-demographic background, academic performance, lifestyle factors and stress are significant predictors of sleep quality among nursing students.

1.7 Conceptual framework

Generally, there are 4 types of nursing courses offered by universities in Malaysia which are certificate, diploma, undergraduate and postgraduate. However, this study only involved nursing students that currently enrolled in diploma and undergraduate level. Nursing students same as the other courses students have to balanced their co-curricular activity and their academic performance during their studies. Due to that they tend to have stress (Cheung et al., 2016). Meanwhile, academic performance also can affect sleep quality (Almojali et al., 2017).

In another study by Safhi et al. (2020), stress has shown to affect the sleep quality of an individual. Besides, sociodemographic background risk factors such as age, gender, race, household income, marital status, educational level, year of study and type of residence can also influence the sleep quality of an individual. It is supported by Park et al. (2019) who reported that age and year of study were identified to be the significant factors. Gender also was identified as the predictor of sleep quality (Blanco et al., 2020). Other than that, a study in Turkey found that household income and type of residence can affect sleep quality as well (Yildirim et al., 2020).

Lifestyle factors such smoking habit, physical activity and caffeine intake can influence the sleep quality. Yildirim et al. (2020) stated that smoking habit is one of the predictors for sleep quality. The other lifestyle factors from previous study were physical activity and caffeine intake that has been stated by Wu et al. (2015) and Safhi et al. (2020) respectively. Lastly, sleep quality can give positive impact and

negative impact to an individual. According to Said et al. (2020), good sleep quality will provide optimal cognitive performance, memory and decision-making while Safhi et al. (2020) stated that cognitive impairment, emotional disturbance and low life satisfaction are the negative impact from having poor sleep quality. Hence, when nursing students are having lack of sleep, it can affect their life and disturb their physical and mental health. The conceptual framework is as summarized in Figure 1.1.



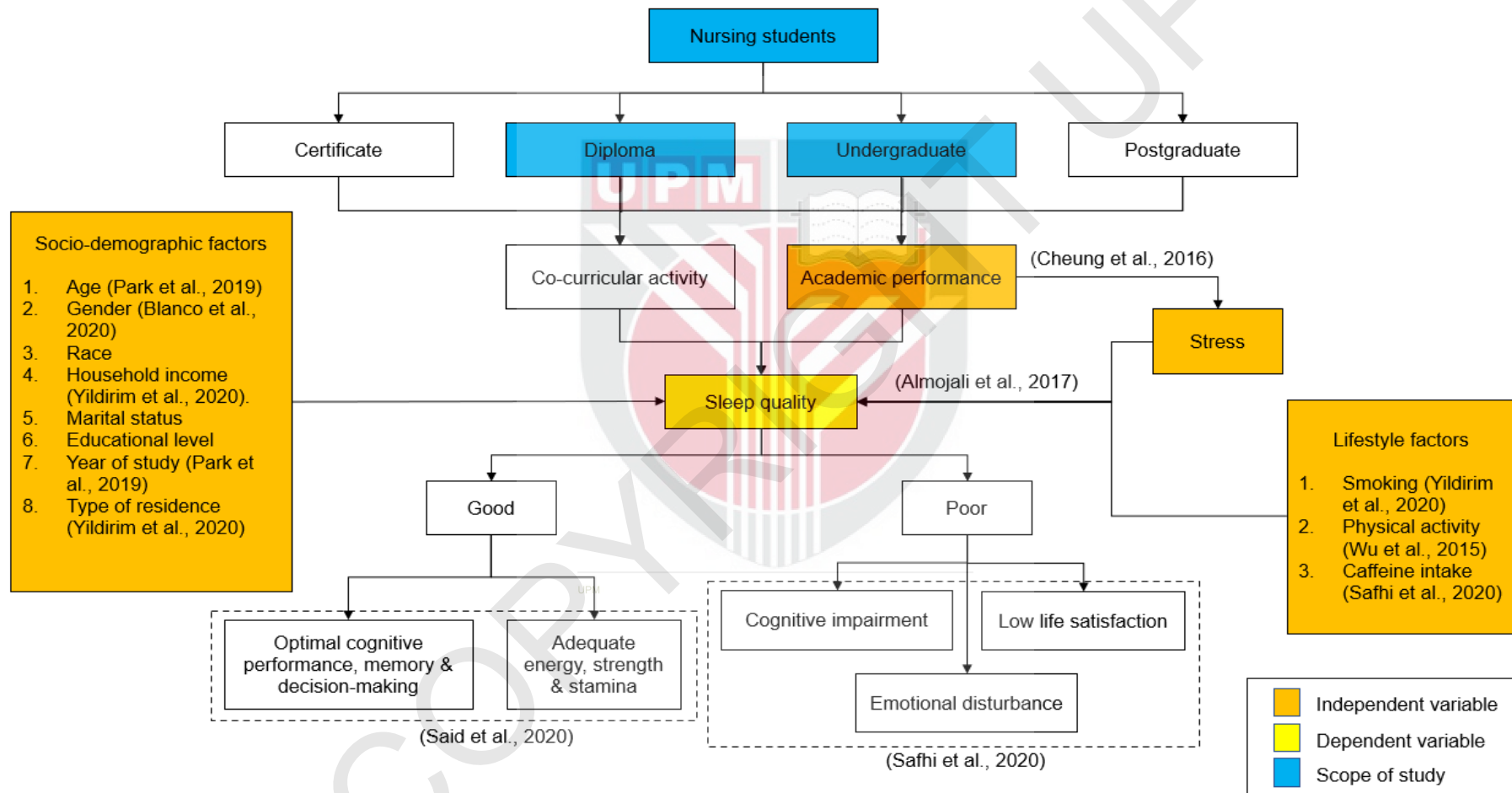


Figure 1.1: Conceptual Framework

1.8 Definition of terms

1.8.1 Socio-demographic background

Conceptual:

A mixture of social and demographic characteristics (Merriam-Webster Dictionary, 2021).

Operational:

Socio-demographic background consists of age, gender, race, household income, marital status, number of children, educational level and year of study and type of residence.

1.8.2 Academic performance

Conceptual:

Outcome of the knowledge gained by students as measured by a teacher's marks or educational goals set by students and teachers to be met over a specified period of time (Abaidoo, 2015).

Operational:

Academic performance is measured by current Cumulative Grade Point Average (CGPA), credit hour taken, studying hours, frequency of academic discussion and amount of clinical placement per week of nursing students.

1.8.3 Lifestyle

Conceptual:

A method of individuals, families and communities coping with their physical, psychological, social and economic aspects on a daily basis (Alioto, 2020).

Operational:

Lifestyle is measured by whether the person is smoking or not, consume alcohol or not, physical activity and its frequency in a week, caffeine intake, use of smartphone and its duration before sleep at night.

1.8.4 Stress

Conceptual:

A great deal of anxiety brought about by a stressful situation (Cambridge Dictionary, 2021).

Operational:

Stress among the respondents in this study is measured by a self-reported questionnaire (Perceived Stress Scale) to determine the perception of stress and degree of stressful events in terms of how unpredictable, uncontrollable, and overloaded during past month (Cohen, 1994).

1.8.5 Sleep quality

Conceptual:

A person's satisfaction with sleep experience in terms of sleep initiation, sleep maintenance, sleep quantity and waking up refreshed (Kline, 2013).

Operational:

Sleep quality is measured by using a self-reported questionnaire (Pittsburgh Sleep Quality Index) in terms of seven components such as subjective sleep quality, sleep latency, sleep length, habitual sleep performance, sleep disruption, use of sleeping medicine, and daytime dysfunction (Ahn & Kim, 2015). Those who have poor sleep quality are also considered as poor sleepers.

CHAPTER 2

LITERATURE REVIEW

2.1 An overview of nursing program

Nursing program is generally a three and four year curriculum to prepare them holistically. There are several requirements that they have to go through such as completing accredited nursing program and pass the Malaysian Nursing Board exam (UCSI-GCA, 2021) which consist of credit hours for both theory and practical. Before being able to practice as a registered nurse, they are required to register with Nursing Board Malaysia and sit for Nursing Board Malaysia Licensure Examination to be licensed (KPJ Healthcare University College, 2021).

All universities in Malaysia including public and private have same fundamental curriculum structure as they are accredited and recognized by the Malaysian Qualification Agency (MQA); the Standard and Guidelines of the Nursing Board of Malaysia is also used to guide the curriculum structure for nursing program (KPJ Healthcare University College, 2021). However, the structure between universities might be slightly different from each other which adjustment are made according to each institution capabilities.

Nursing program are different from the other programs since most of them will have clinical practice every semester. Meanwhile, the other programs especially health science programs require students to undergo practical during last semester or final year. For example, nursing program at Universiti Kebangsaan Malaysia (UKM) has been set up clinical practice during each semester. They will have eight clinical practices overall which will be conducted starting from first semester until last semester. The private university such as MAHSA University also offered nursing program with at least one clinical practice for every semester for diploma and bachelor (MAHSA University, 2021). Other than that, theoretical learning and hands-on training in simulation ward also makes nursing program different with other programs as well. Therefore, they need to cope both classes and practicum load effectively.

2.2 Stress among nursing students

2.2.1 Definition of stress

Nowadays, stress is one of the mental health problems that is concerned worldwide. The scope of stress could be technically referring to either physical stress or psychosocial stress. Psychosocial stress defined stress as a great deal of anxiety brought about by a stressful situation (Cambridge Dictionary, 2021). Meanwhile, physical stress defined stress as the body's wear and tear as it responds to pressure or a potentially dangerous situation (Almojali et al., 2017).

Stress is also be known as a reaction of the body when react with the any changes occur, resulting physical and mental responses. Zhai et al. (2020) stated that stress referred to when people see a stressful situation or challenging but they don't have enough resources to deal with it. Stress can be either good or bad for health which are eustress and distress. Eustress or positive stress usually motivate the person and it will occur in a short term. Meanwhile, distress or negative stress will cause anxiety as it will lead to physical and mental problems in a long term (Zencare team, 2019).

2.2.2 Prevalence of stress among nursing students

According to literature review, many studies reported that there is high prevalence of high level of stress among nursing students. In a research study in Uganda, Amany et al. (2017) reported that the prevalence of stress among nursing students are 63.3%. Meanwhile, there is 64% of nursing students who are having stress in private university in Brazil (Cestari et al., 2017). Another study by Abebe et al. (2018) reported that 47.7% of nursing students are prevalent to stress in Ethiopia.

Plus, in Malaysia, Masilamani et al. (2019) also stated that about 25% of nursing students are having stress. About 82.6% of nursing students are having stress in a study conducted by Rathnayake & Ekanayaka, (2016) in a public university in Sri Lanka. According to Cheung et al. (2016), the prevalence of stress among nursing students in Hong Kong is 41.1%. Meanwhile, there is 75% of nursing students who are experience stress at a medical college in Nepal (Manandhar & Pramanik, 2019).

Table 2.1: Summary of studies on prevalence of stress

Author (Year)	Country	No of respondents	Population	Prevalence of stress	Risk factors (p<0.05)
Amanya et al. (2017)	Uganda	258	Health professional students that consist of medical, nursing and dental students	63.3%	Academic curriculum, dissatisfaction with class lectures, lack of time for recreation, performance in examination, high parental expectation, financial problems
Cestari et al. (2017)	Brazil	455	Nursing students who are first year, third year and fifth year	64%	Marital status, children, occupational situation, year of study
Abebe et al. (2018)	Ethiopia	422	Nursing students	47.7%	Sex, fear of examination, living in uncomfortable environment, perceived present illness
Masilamani et al. (2019)	Malaysia	96	Nursing students from year 1 to year 3	25%	Confidence stressors, self-blame
Rathnayake & Ekanayaka (2016)	Sri Lanka	92	Undergraduate nursing students from first year to fourth year	82.6%	Possible stressors, self-rated physical health, self-rated mental health
Cheung et al. (2016)	Hong Kong	661	Nursing students	41.1%	Year of study, academic failure, financial difficulty, lack of sleep
Manandhar & Pramanik (2019)	Nepal	174	Undergraduate first year of medical students, dental students and nursing students	75%	Academic related stressors

2.2.3 Effects and impacts of stress

High level of stress has been shown to lead to several other problems such as negative emotions, poor academic performance and poor health behaviours. This was strongly supporting the statement with another research study which is conducted by Zhai et al. (2020), people who are under a lot of stress are more likely to experience negative feelings such as depression, suicidal ideation, and insufficient sleep. Almojali et al. (2017) reported that high levels of stress, in particular, may have an impact on the cognitive functioning, focus and academic performance.

A study by Safhi et al. (2020) stated that high stress levels is also associated with poor health behaviours, students who were stressed ate unhealthier foods, were less likely to exercise and slept poorly. As a result, students experienced physical, emotional, behavioural, and academic issues as a result of their stress. Other range of non-specific effects of stress which may be triggers by stress are sleep problems, including restless sleep, awakening in the middle of the night and waking up too early. Sleep disorder will be further discussed in next subchapter.

2.2.4 Risk factors of stress among nursing students

Nursing students are considered to be more stressed than students in other majors due to the demands of professional learning and clinical practice (Ahn & Kim, 2015). They faced a lot of stressors such as moving to college, lifestyle changes, heavy

course loads, balancing study, job and family life and also coping with relationship issues (Zhang et al., 2018). In Saudi Arabia, a research study by Safhi et al. (2020) stated that academic overload, overnight on-call duties, contact with diseases and deaths, regular tests, and extensive curricula are all factors that will lead to stress.

Meanwhile, uncontrollable or unpredictable stressors such as hurricanes, earthquakes and tsunamis also can disrupt sleep by causing lower sleep quality, longer sleep latency, increasing consciousness during the night and more sleep complaints (Zhao et al., 2021). The other factor is current study period. According to Cestari et al. (2017), year of study is also significant to stress among nursing students.

In addition, sleep disorder can also cause stress as was reported by Zhang et al. (2018) which reported sleep quality to be significantly associated with perceived stress in a research study in northeast U.S. Extensively, academic performance can also lead to stress. This is shown by a research study in Pakistan by Parveen and Inayat (2017) which stated that academic performance is a source of stress due to obtaining lower grade.

2.2.5 Measurement of stress

Stress can be measured by a variety of self-reported questionnaire such as Perceived Stress Scale (PSS) and Depression Anxiety Stress Scale (DASS). PSS consists of three versions which are PSS-4, PSS-10 and PSS-14. However, the Perceived Stress

Score 10 items (PSS-10) is widely used across the world to measure perceived stress among any population by assessing the two components which are perceived distress and perceived coping (Cohen et al., 1983).

PSS-10 has been translated into over 25 languages and has been validated globally. There are many studies that measure stress by using verified PSS-10 in specific population such as policewomen and university students in China (Huang et al., 2020). The internal consistency of PSS-10 is high ranging from 0.67 to 0.91 (Liu et al., 2020). One of the advantages is the researcher can determine emotional changes of respondents towards stressful situations (Jimin Lew, 2016). The disadvantage is it the scale need to validated first if use in diverse population (Lee, 2012).

Depression Anxiety Stress Scale (DASS) is another questionnaire that can be used to measure stress. DASS consists of two versions which are DASS-21 and DASS 42. The common version use in many studies is DASS-21. It has been well established and widely used to measure to measure the three components which are depression, anxiety and stress. It has been validated among adolescent and have good reliability which is the internal consistency ranging from 0.761 to 0.906 (Thi et al., 2017).

The advantage of using DASS-21 is that it assists in identifying the cause of psychological distress of a person while the disadvantage of using DASS-21 is the difficult to differentiate one emotional state from others. A study by González-Rivera et al. (2020) reported that it is difficult to differentiate people with symptom of depression from who have anxiety.

Next, Kessler Psychological Distress Scale also can be used to measure stress. It is a simple measurement of psychological distress and extensively used in many epidemiological studies (Almojali et al. 2017). It consists of two versions which are K10 and K6 scales. This tool assesses the severity of stress during the past month. It is well established self-administered questionnaire that contains several questions based on emotional states.

It has been validated among adults and have good reliability which is the Cronbach's alpha value = 0.91 (Pereira et al., 2019). The advantage of using K10 is it can be used to assist in treatment planning and monitoring. The disadvantage is it has limitation on the scope because it does not cover some important components which can be used in clinical diagnosis (Brooks et al., 2006).

Standard Stress Scale (SSS) can measure stress among general populations. It measures stress with variety of dimensions such as workload, social distress, exhaustion and uncertainty about the future. It has been validated among many populations from adolescent to retirees (Allmendinger et al., 2014). The internal consistency of SSS ranging from 0.58 to 0.66. The advantage of using SSS is it cover all dimensions of stress while the disadvantage is the items are not adapted to specific life events.

Furthermore, the other instrument is Covid-19 Student Stress Questionnaire (CSSQ). It is specifically developed to assess the perceived stress among university students during the pandemic lockdown. It contains several questions that cover different

components such as relationship and academic life, isolation and fear of contagion. This tool is validated among university students and have good internal consistency which is 0.71 (Zurlo et al., 2020). The advantage of using CSSQ is it serves as monitoring tool in assisting health practitioners especially for counselling interventions. Meanwhile, the disadvantage is it not widely used in many countries.

This study will use Perceived Stress Scale (PSS) as this measurement tools will measure the perceived stress among target populations. Moreover, this questionnaire is widely used by many studies and has been already proven its validity and reliability. This questionnaire will not consider anxiety and depression like the other questionnaires for measuring stress since this study just want to measure stress among nursing students.

Table 2.2: Summary of studies on measurement of stress

Instruments	Criteria	Quantification	Validity and reliability	Advantage	Disadvantage
Perceived Stress Scale	Scale	Likert scale	Validated among policewomen and university students in China and reliability with Cronbach's alpha ranging from 0.67 to 0.91	Can determine emotional changes of respondents towards stressful situations	Need to validate the scale first if use in diverse population
Depression Anxiety Stress Scale	Score	Continuous score	Validated among adolescent and reliability with Cronbach's alpha ranging from 0.761 to 0.906	Assists in identifying the cause of psychological distress of a person	Not able to differentiate one emotional state from others
Kessler Psychological Distress Scale	Scale	Likert scale	Validated among adults and reliability with Cronbach's alpha 0.91	Assist in treatment planning and monitoring	Only cover limited scope of items
Standard Stress Scale	Scale	Likert scale	Validated among general population from adolescent to retirees and reliability with Cronbach's alpha ranging from 0.58 to 0.66	Covering all main stress dimensions	Not adapted to specific life events
COVID-19 Student Stress Questionnaire	Scale	Likert scale	Validated among university students and reliability with Cronbach's alpha 0.71	Serve as monitoring tool in assisting health practitioners	Not widely used in many countries

2.3 Sleep and its disorders among nursing students

2.3.1 Definition of sleep disorders

Poor sleep quality is also a major public health concern beside high stress level. Good sleep quality is very important for human wellbeing as it will affect physical and mental health. According to Kline (2013), sleep quality is defined as satisfaction with the sleep experience, which consist of elements such as sleep initiation, sleep maintenance, sleep quantity and waking up refreshed.

Sleep quality is determined by a lot of factors, including the amount of sleep which is 4–10 hours per day, the time it takes to fall asleep, the pace at which people wake up and the mood when people wake up (Kunzweiler et al., 2016). The average adult requires 7 to 9 hours of sleep a night (AH et al., 2020). There are two phase of sleep cycle which are Rapid Eye Movement (REM) sleep and non-REM sleep (Leonard, 2017).

The sleep cycle starts with three stages of non-REM sleep followed by one stage of REM sleep. Those stages are important as all of them can cause sleep problems. Sleep disorder can be defined as the conditions that make it difficult to get quality sleep (Roddick, 2020). There are many types of sleep disorders such as insomnia, sleep apnea, restless legs syndrome (RLS) and narcolepsy.

2.3.2 Prevalence of sleep disorders among nursing students

According to literature review, many studies reported that there is high prevalence of poor sleep quality among nursing students. A research study in Korea by Park et al. (2019) reported that 69.6% participants having sleep disorder. Silva et al. (2016) also stated that about 63.2% of nursing students are prevalent to poor sleep quality in a research study among different nursing and health schools in Portugal. Meanwhile, a research study in Spain stated that the prevalence of poor sleep quality among nursing students is 60.4% (Blanco et al., 2020). In Turkey, a study at a public university by Yildirim et al. (2020) reported that 77.1% have problems with sleep.

Table 2.3: Summary of studies on prevalence of sleep disorders

Author (Year)	Country	No of respondents	Population	Prevalence of sleep disorder	Risk factors (p<0.05)
Silva et al. (2016)	Portugal	403	Nursing students at minimum age of 18 years and maximum of 54 years	63.2%	Anxiety, daytime sleepiness
Park et al. (2019)	Korea	237	Nursing students	69.6%	Age, academic level, overall wellness, emotional wellness, occupational wellness
Blanco et al. (2020)	Spain	207	Nursing students	60.4%	Woman, first year student, second year students, alcohol consumption, normal BMI, those who live with family
Yildirim et al. (2020)	Turkey	512	Nursing students	77.1%	Income rate, place of residence, smoking, using of alcohol

2.3.3 Effects and impacts of sleep disorders

Sleep should be a major concern for university students whose academic performance is a priority since it affects their cognitive functioning (Silva et al., 2016). While a good night's sleep is vital for optimal cognitive performance, memory, and decision-making in order to excel and master their learning needs (Said et al., 2020). A disruption, even a short term, disturbed and insufficient sleep can cause poor judgement, agitation, irritability and inability to process information (Maheshwari & Shaukat, 2019).

This was in coherence with the statement with study by Kumar et al. (2019) which showed cognitive impairment, impaired social functioning, injuries, increased risk of falls and daytime exhaustion are all consequences of poor sleep quality as well as a reduction in physical and mental wellbeing and health-related quality of life. Safhi et al. (2020) also describe sleep deprivation being strongly linked to emotional disturbances, feelings of frustration, stress, depression, confusion, and fatigue among students, as well as cognitive and memory difficulties and overall low life satisfaction.

A long-term sleep disorders lead to cardiometabolic disorders and even increased mortality (Maheshwari & Shaukat, 2019). This was strongly supported by Silva et al. (2016) which describe the link of poor sleep quality to increased morbidity from autonomic dysfunction, psychological illness, poor academic performance, premature ageing, depression, and reduced work productivity. This was similarly

described by Azri et al. (2016) where sleep deprivation was associated to increased risk of heart disease, depression, falls and injuries and Kunzweiler et al. (2016) that back pain and high blood pressure are affected by poor sleep quality.

In terms of psychological aspect, Zhang et al. (2018) stated that sleep disruptions have been associated to mental health problems and have been shown to play a crucial role in mental wellbeing. In Korea, a research study conducted by Park et al. (2019) stated that high blood pressure, heart disease, neurological diseases, digestive complications, and cancer are physical illnesses while mental illness like depression and anxiety are also related to poor sleep quality as well. Overall, sleep disruption, sleep problems and poor sleep quality will lead to a decrease in health and quality of life (Azri et al., 2016).

2.3.4 Risk factors of sleep disorders

Sleep issues among undergraduate nursing students are due to a variety of factors, including a new social and academic environment, frequency of social media usage and unhealthy lifestyle choices. In the same article, it is also stated that nursing students typically have a poor quality of life as a result of their heavy academic workload, hospital shifts, and long hours of night research, which may affect their sleep quality and increase the likelihood of excessive daytime sleepiness (El Hangouche et al., 2018).

Ngu et al. (2017) also stated that sleep quality in students may be affected by multiple other factors including gender, year of study, caffeine intake, smoking and alcohol consumption. In addition to these factors, sleep problems also have been caused by another factor which is excessive smartphone use among university students (Park et al., 2019). On top of that, another factor of poor sleep quality might be stress. Almojali et al. (2017) reported that poor sleep quality is contributed by stress. In the same article, it also stated that the current GPA which is indicate their academic performance is significant to sleep disorders.

2.3.5 Measurement of sleep disorders

Pittsburgh Sleep Quality Index (PSQI) is widely used in clinical settings and research. PSQI is a useful tool for determining the consistency and pattern of sleep and has been verified with more than 50 languages across the world. It has been validated in both clinical and non-clinical populations for assessing subjective sleep quality. The questionnaire measures seven components related to sleep which are subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction.

PSQI has been validated among nursing students and it has good reliability with internal consistency of Cronbach's alpha = 0.68 (Zhang et al., 2018). The advantages of using PSQI are low cost, therapeutic response and easy to administered (Manzar et al., 2018). Meanwhile, the disadvantage is it is designed to measure the larger concept of sleep quality rather than just insomnia only (Ong et al., 2017).

The other measurement of sleep disorder is Epworth Sleepiness Scale (ESS). It is also one of subjective assessments that can be used other than Pittsburgh Sleep Quality Index (PSQI). ESS is a standard assessment tool that measures daytime sleepiness (Santos-Longhurst, 2019). It is originally developed for adult but it is widely used for adolescent and children by using the modified version of ESS which is ESS-CHAD (Eppworth Sleepiness Scale for Children and Adolescent).

The questionnaire has been validated among people with sleep disorder and medical students and it has high reliability with internal consistency of Cronbach's alpha which are 0.88 and 0.73 respectively (Johns, 1992). The advantage of using ESS is it is simple and easy to conduct beside it can be completed in a short time. Meanwhile, the disadvantage of ESS is it is unable to measure changes in sleepiness from day to day and detect initiation of REM.

Next, Insomnia Severity Index (ISI) also can be used to measure sleep disorder. It is widely used in many populations and available in different languages such as French and Chinese. This self-reported questionnaire assesses sleep onset and sleep maintenance difficulties, associated distress and interference with daily problems. This tool asks several questions on those components within past fortnight (Vegar & Hussain, 2017). ISI is validated among university students and it has good reliability with internal consistency of Cronbach's alpha which is 0.84. The advantage of using ISI is it easy to administer and brief while the disadvantage is it does not examine the frequency of symptoms since the scale only focus on impact and severity of insomnia (Smith & Wegener, 2003).

Furthermore, the other measurement tools are Mini Sleep Questionnaire (MSQ). It is used in clinical studies and has been translated into several languages. It also is used to measure two components which are sleep quality and daytime sleepiness. It is validated among public and it has good reliability with internal consistency of Cronbach's alpha which is 0.77 (Natale et al., 2014). The advantage of using MSQ is it has good efficiency to identify poor sleepers. Meanwhile, the disadvantage of MSQ is it can be influenced by the same sources of bias (Ibáñez et al., 2018).

The other questionnaire is Jenkins Sleep Scale (JSS). It is standardized widely used measurement questionnaire to measure sleep disturbances and has been efficient in clinical studies among general populations. It assesses sleep problems during the past month and asks several questions based on difficulties in falling asleep and staying asleep, frequent wake up at night and waking up feeling tired. This tool is validated among adults and it has good reliability with internal consistency of Cronbach's alpha which is 0.80 (Juhola et al., 2021). The advantage of using JSS is it simple and easy to do questionnaire. Meanwhile, the disadvantage of JSS is it may produce biased data (Jenkins et al, 1988).

This study will use Pittsburgh Sleep Quality Index (PSQI) as this measurement tools will measure the overall sleep quality among target populations. Moreover, this questionnaire is widely used by many studies and has been already proven its validity and reliability. This questionnaire will consider seven components such as subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep

disturbances, use of sleeping medication and daytime dysfunction since this study want to measure the sleep quality among nursing students.



Table 2.4: Summary of studies on measurement of sleep disorders

Instruments	Criteria	Quantification	Validity and reliability	Advantage	Disadvantage
Pittsburgh Sleep Quality Index	Score	Continuous score	Validated among nursing students and reliability with internal consistency of Cronbach's alpha = 0.68	Low cost, therapeutic response and easy to administered	It is designed to measure the larger concept of sleep quality rather than just insomnia only
Epworth Sleepiness Scale	Scale	Likert scale	Validated among people with sleep disorder and medical students and reliability with internal consistency of Cronbach's alpha which are 0.88 and 0.73 respectively	Simple and easy to conduct beside it can be completed in a short time	Unable to measure changes in sleepiness from day to day and detect initiation of REM
Insomnia Severity Index	Scale	Likert scale	Validated among university students and reliability with internal consistency of Cronbach's alpha = 0.84	Easy to administer and brief	Limited to questions on insomnia instead of assessing frequency of symptoms
Mini Sleep Questionnaire	Scale	Likert scale	Validated among public and reliability with internal consistency of Cronbach's alpha = 0.77	Efficient in identifying bad sleepers	Can be influenced by the same sources of bias
Jenkins Sleep Scale	Scale	Likert scale	Validated among adults and reliability with internal consistency of Cronbach's alpha = 0.80	Simple and easy to conduct	May produce biased data

CHAPTER 3

METHODOLOGY

3.1 Study design

A cross-sectional study design was used to collect data on the prevalence of stress and sleep quality and the association between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality among nursing students. The duration of this study was 3 months starting from August 2021 to October 2021.

3.2 Study location

The study location for this study was throughout Malaysia depending on the location where the nursing program were being offered in the colleges and universities. The map of Malaysia was shown in Figure 3.1 below.



(Source: Google Maps)

Figure 3.1: Map of Malaysia

3.3 Sampling method

3.3.1 Sampling strategy

Purposive sampling method was used to distribute via email of the coordinator for nursing program at each university which had been offering nursing program. Then, it would be passed by the coordinator to their respective students. Other than that, the questionnaire also would be distributed to all nursing students that were eligible to participate based on inclusion criteria via social media platforms such as WhatsApp, Twitter, Instagram and Facebook. This method was chosen because it was cheap, efficient and easy to implement due to the current pandemic situation in Malaysia. However, careful consideration should be taken during interpretation of the results as the weakness of purposive sampling method was that generalization cannot be made to the general population.

3.3.2 Sampling population

All university students that enrolled in nursing program were eligible to participate.

3.3.3 Sampling frame

The list of universities and colleges offering nursing program were referred to Malaysian Qualifications Agency (MQA) website. Only those which the MQA accreditation was still valid would be included in this study as follow:

1. Adventist College of Nursing and Health Sciences
2. AIMST University
3. Armed Forces Health Training Institute
4. Asia Metropolitan College Kota Kinabalu
5. Asia Metropolitan University
6. City University
7. ICAN College
8. Institut Latihan Kementerian Kesihatan Malaysia (Kejururawatan) Alor Setar, Kedah
9. Institut Latihan Kementerian Kesihatan Malaysia (Kejururawatan) Bertam, Pulau Pinang
10. Institut Latihan Kementerian Kesihatan Malaysia (Kejururawatan) Kuala Pilah, Negeri Sembilan
11. Institut Latihan Kementerian Kesihatan Malaysia (Kejururawatan) Kubang Kerian, Kelantan

12. Institut Latihan Kementerian Kesihatan Malaysia Johor Bahru, Johor
13. Institut Latihan Kementerian Kesihatan Malaysia Kota Kinabalu, Sabah
14. Institut Latihan Kementerian Kesihatan Malaysia Sultan Azlan Shah Ipoh,
Perak
15. Institut Sains Dan Teknologi Darul Takzim (INSTEDT)
16. International Institute of Science Mantin
17. International Islamic University Malaysia (IIUM)
18. International Medical College Melaka
19. International Medical College Subang Jaya, Malaysia
20. International Medical University (IMU)
21. ITA College
22. Kolej I-Systems Kuching
23. Kolej Poly-Tech MARA Kota Bharu (Additional Premises)
24. KPJ Healthcare University College
25. KPJ International College of Nursing and Health Sciences Johor Bahru
Branch
26. Lake View College
27. Lam Wah Ee Nursing College
28. Lincoln University College
29. MAHSA University
30. Management and Science University (MSU)
31. Murni International College
32. Nilai University
33. Oriental Nilam College of Nursing and Health Sciences
34. PICOMS International University College (PIUC)

35. Ramsay Sime Darby Healthcare College
36. SEGi College Kuala Lumpur
37. Sunway University
38. Tun Tan Cheng Lock College of Nursing
39. Tung Shin Academy of Nursing
40. UCSI University
41. Universiti Kebangsaan Malaysia (UKM) (Cheras)
42. Universiti Kuala Lumpur Kampus Cawangan Royal College of Medicine Perak (UniKL-RCMP)
43. Universiti Malaysia Sabah (UMS)
44. Universiti Malaysia Sarawak (UNIMAS) (Kota Samarahan)
45. Universiti Putra Malaysia (UPM)
46. Universiti Sains Malaysia (USM) (Health Campus) (Kubang Kerian)
47. Universiti Selangor (UNISEL), Shah Alam Campus
48. Universiti Sultan Zainal Abidin (UniSZA) (Gong Badak Campus)
49. Universiti Teknologi MARA (UiTM) Cawangan Selangor Kampus Puncak Alam
50. Universiti Tunku Abdul Rahman (UTAR) Sungai Long Campus
51. University College Bestari
52. University College of Islam Melaka
53. University of Malaya
54. UOW MALAYSIA KDU Penang University College
55. Vision College
56. Widad University College
57. Windfield International College

3.3.4 Sampling unit

Nursing students from public and private university who had met with the inclusion criteria of the study. The criteria which would be used as screening criteria were as follow:

3.3.4.1 Inclusion criteria

1. Malaysian
2. Full-time students
3. Age above 18 years old
4. Enrolled in undergraduate nursing program in Malaysia (diploma or degree)

3.3.4.2 Exclusion criteria

1. Nursing students who were clinically diagnosed with psychiatric illnesses and having treatment for sleep problems
2. Nursing students who deferred their studies (example: postpone semester, currently in progress to change program, etc.)

3.4 Instruments

This study would utilize a questionnaire in the form of online survey. The developed questionnaire consists of adaptation of several validated questionnaires which had been used to assess stress level and sleep quality. The questionnaire was written in both languages which were English and Malay. The questionnaire would contain the following sections:

3.4.1 Socio-demographic background

There would be eight questions which ask the specific question on age, gender, races, household income, marital status, number of children, educational level and year of study and type of residence. The questionnaire was as attached in section A of Appendix 1.

3.4.2 Academic performance

There would be five question which ask the specific question on current Cumulative Grade Point Average (CGPA), credit hour taken, studying hours, frequency of academic discussion per week and amount of clinical placement per week. The questionnaire was as attached in section B of Appendix 1.

3.4.3 Lifestyle factors

There would be seven questions which ask the specific question on smoking, alcohol, physical exercise and its frequencies, caffeine intake and use of smartphone before sleep and its duration. The questionnaire was as attached in section C of Appendix 1.

3.4.4 Perceived Stress Scale (PSS-10)

Perceived Stress Scale (PSS) is widely and well-established self-report scale measuring perceived stress. It was used to measure the stress perception and developed by Cohen et al. (1983). PSS is a popular tool to measure individual stress level precisely and has been translated into many versions such as Malay, Chinese, Korean and others. According to Zhang et al. (2018), in a research study conducted at public university in northeast U.S., the reliability of study sample in the questionnaire is high with Cronbach's $\alpha = 0.88$. This is strongly supported by research study by Liu et al. (2017), it reported that PSS's reliability and validity had previously been established in China. In Malaysia, PSS's validity and reliability were conducted by Sandhu et al. (2015). The Cronbach's α value of the scale in the research has been found as 0.63. The outcome of use this questionnaire is it has been validated since it frequently being used for stress research.

This section was modified from Cohen et al. (1983) and Sandhu et al. (2015). There were 10 items that asking respondents regarding on stressful situation during past

month. It was to understand how different situations affect their feelings and perceived stress. PSS measured the two components which were perceived distress and perceived coping. Each item was provided with 5 points Likert-scale which started from 0 to 4. The respondents were required to answer the questions based on the Likert-scale consisting of “never”, “almost never”, “sometimes”, “fairly often” and “very often”. The total score ranged from 0 to 40. The higher scores indicated the higher levels of perceived stress and vice versa. The score ranged from 0-13 for low stress, 14-26 for moderate stress and 27-40 was considered as high stress (Cohen et al., 1983). The questionnaire was as attached in section D of Appendix 1. The scoring was calculated based on Table 3.1 below.

Table 3.1: Perceived Stress Scale Scoring Calculation

Reverse the score for questions 4, 5, 7 and 8. On these 4 questions, change the scores like this:	
$0 = 4, 1 = 3, 2 = 2, 3 = 1, 4 = 0$	
Then, add up the scores for each item to get a total. My total score is _____	
Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress.	
Score	Level of stress
0-13	Low stress
14-26	Moderate stress
27-40	High perceived stress

3.4.5 Pittsburgh Sleep Quality Index (PSQI)

Pittsburgh Sleep Quality Index (PSQI) is the best option to access sleep quality since it is widely used in clinical and research. It was developed by Buysse et al. (1989). PSQI is a useful tool for determining the consistency and pattern of sleep and has been translated into many languages such as Malay, Korean, Portuguese and others. It has been validated in both clinical and non-clinical populations for assessing subjective sleep quality. According to Zhai et al. (2020), it is a highly accurate and reliable instrument that was created specifically to assess sleep quality. As recorded in previous nurse studies, the reliability is consistent with Cronbach's alpha = 0.68 (Zhang et al., 2018). In Malaysia, PSQI's validity and reliability were conducted by Farah et al. (2019). The Cronbach's alpha value of the scale in the research has been found as 0.74. The outcome of use this questionnaire is it has been validated since it frequently being used for sleep quality research.

This section was modified from Buysse et al. (1989) and Farah et al. (2019). There were 19 items that asking respondents regarding on sleep habits and problems during past month. It was to understand their quality of sleep whether they have difficulties to fall asleep or not. There were seven components that had been assessed in the questionnaire such as subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction. Each component had a range score of 3 while the total of the seven components' scores ranged from 0 to 21. The global score of PSQI means the sum of all seven components' scores from first component until the last component. A good

sleepers was indicated by the PSQI global score of <5 while poor sleepers had PSQI global score of >5 . The questionnaire was as attached in section E of Appendix 1. The scoring was calculated based on Table 3.2 below.

Table 3.2: Pittsburgh Sleep Quality Index Scoring Calculation

1. Subjective sleep quality	Question 6 was examined as follow:	
	Response	Score
	Very good	0
	Fairly good	1
	Fairly bad	2
	Very bad	3
	Element 1 score: ____	
2. Sleep latency (minutes)	Question 2 was examined as follow:	
	Response	Score
	≤ 15 minutes	0
	16-30 minutes	1
	31-60 minutes	2
	>60 minutes	3
	Question 5a was examined as follow:	
	Response	Score
	Not during the past month	0
	Less than once a week	1
	Once or twice a week	2
	Three or more times a week	3

	Add score question 2 and 5a = Then, the score was assigned as follow: (0=0, 1-2=1, 3-4=2, 5-6=3) Element 2 score: _____	
3. Sleep durations (hours)	Question 4 was examined as follow:	
	Response	Score
	>7 hours	0
	6-7 hours	1
	5-6 hours	2
	<5 hours	3
	Element 3 score: _____	
4. Habitual sleep efficiency (%)	(Number of hours sleep/ Number of hours spent in bed) x 100= _____%	
	Habitual sleep efficiency %	Score
	>85	0
	75-84	1
	65-74	2
	<65	3
	Element 4 score: _____	
5. Sleep disturbances	Examine and add the scores for question 5b-5j. Scores was assigned as below.	
	Response	Score
	Not during the past month	0
	Less than once a week	1
	Once or twice a week	2
	Three or more times a week	3
	Then, the total sum of 5b-5j was assigned as follow: (0=0, 1-9=1, 10-18=2, 19-27=3) Element 5 score: _____	

6. Use of sleep medications	Question 7 was examined as follow:	
	Response	Score
	Very good	0
	Fairly good	1
	Fairly bad	2
	Very bad	3
	Element 6 score: _____	
7. Daytime dysfunction	Question 8 was examined as follow:	
	Response	Score
	Never	0
	Once or twice	1
	Once or twice each week	2
	Three or more times each week	3
	Question 9 was examined as follow:	
	Response	Score
	No problem at all	0
	Only a very slight problem	1
	Somewhat of a problem	2
	A very big problem	3
	Score question 8 + question 9 =	
	Then, the scores was assigned as follow: (0=0, 1-2=1, 3-4=2, 5-6=3)	
	Element 7 score: _____	
Total PSQI score	Add the seven elements' scores: _____	
	Then, the scores were assigned as follow:	
	Global PSQI scores	Score
	Good sleep quality	0 to ≤ 5
	Poor sleep quality	6 to 21

3.5 Quality control

Before conducting the research, validity and a pre-test questionnaire were performed to determine its reliability. For validity, content validity and face validity were used as content validity was validated by nursing lecturers while face validity was validated by nursing students. For reliability, the minimum of 30 students were recruited to verify the reliability of the questionnaire. The Cronbach Alpha value of the pilot study was 0.80 which was considered acceptable and very good.

3.6 Data collection procedure

This study was conducted upon obtaining the approval from Ethic Committee for Research Involving Human Subjects of Universiti Putra Malaysia (JKEPUPM) and after receiving permission from the respondent. Then, the developed questionnaire was given to two experts for content validity. After experts had validated the questionnaire, it was given to two students for face validity.

Next, the questionnaire was modified based on comments from the validity process. Then, a pre-test was conducted to 30 students in Universiti Putra Malaysia (UPM). After obtaining the result of pre-test, the reliability of the questionnaire was determined using Cronbach Alpha value for internal consistency.

The questionnaire was distributed via email of the coordinator for nursing program at each university which had been offering nursing program. Then, it would be passed by the coordinator to their respective students. Social media platforms such as WhatsApp, Twitter, Instagram and Facebook also were used to distribute the questionnaire and it was distributed twice a day in order to remind the participants. Once the minimum respondent was achieved, the data would be transferred into SPSS and run for data analysis. The data collection process flowchart was shown in Figure 3.2.



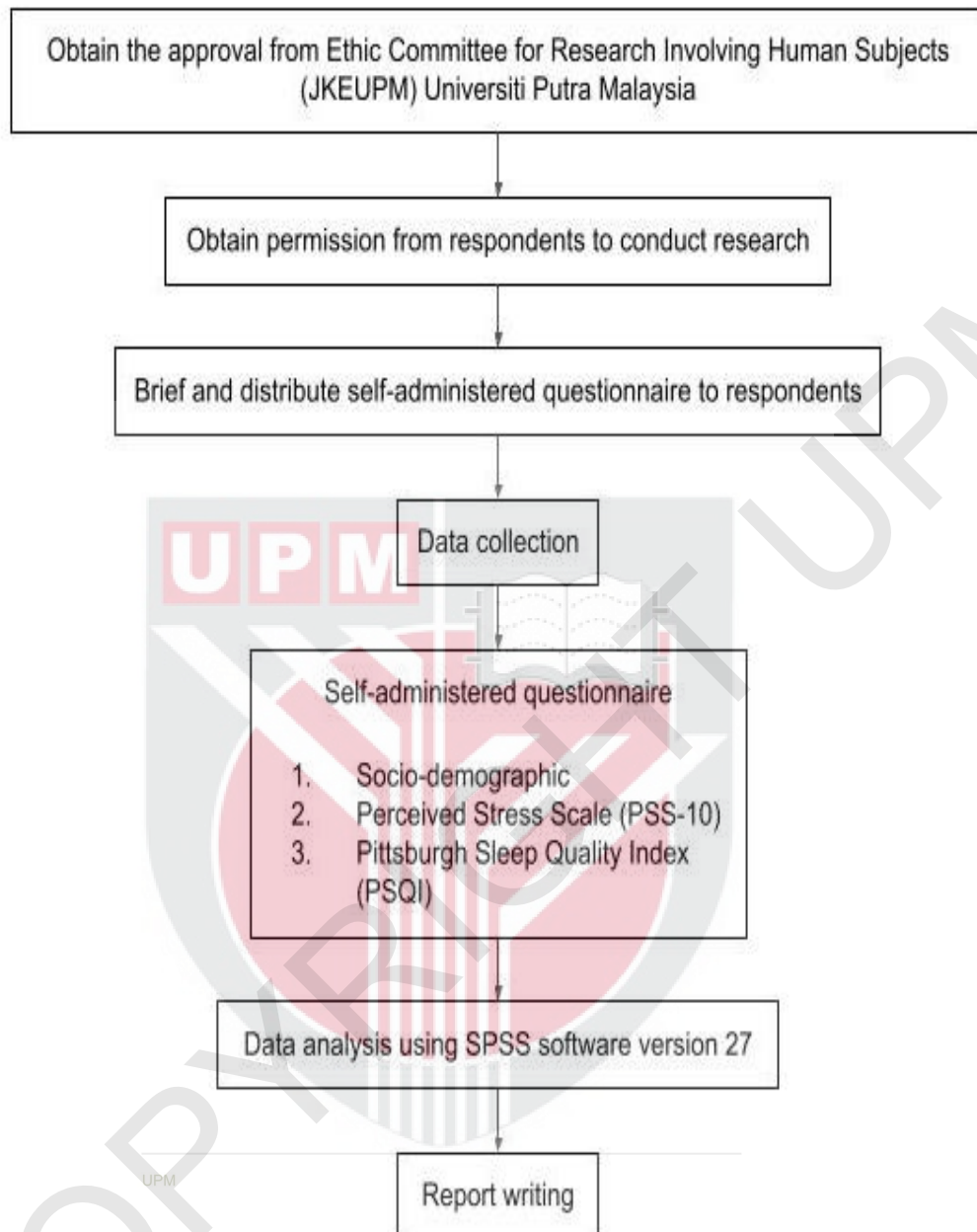


Figure 3.2: Flowchart on sampling procedure

3.7 Data analysis

All data collected were analysed by using Statistical Package for the Social Sciences (SPSS) Version 27. Descriptive analysis was performed to obtain the frequency, percentage, mean and standard deviation for socio-demographic background, academic performance, lifestyle factors and prevalence of stress and sleep quality of the respondents.

To determine the data normality, normality test was conducted by using Kolmogorov-Smirnov test. All the items for both independent and dependent variables were analysed independently. The description of categorical data was presented in frequency and percentage. Continuous data also were categorized as well. All the variables with p-value less than 0.05 were reported as significantly associated predictors.

For hypothesis testing, bivariate analysis was performed in order to determine the significant association between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality among nursing students. Multivariate analysis also was performed in order to determine the predictors associated with sleep quality among nursing students.

Table 3.3: Statistical analysis on specific objectives

No.	Objectives	Statistical Analysis
1.	To determine socio-demographic background, academic performance, lifestyle factors and stress among nursing students	Descriptive Analysis • Percentage • Frequency • Mean • Standard deviation
2.	To determine the prevalence of sleep quality among nursing students	Descriptive Analysis • Percentage • Frequency • Mean • Standard deviation
3.	To determine the association between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality among nursing students	Bivariate Analysis • Chi-Square
4.	To determine the predictors associated with sleep quality among nursing students	Multivariate Analysis • Multiple logistic regression

3.8 Ethical consideration

This research proposal was submitted to the Ethics Committee for Research Involving Human Subjects of University Putra Malaysia (JKEUPM) to be reviewed and to receive acknowledgement. The questionnaire was distributed to all respondents and they had been given consent form before answering the questionnaire. The survey questionnaire provided respondents a detail explanation to ensure they understand about the research. All the data of respondents would be remained confidential. The details of consent form were shown on Appendix 3.

CHAPTER 4

RESULTS

4.1 Distribution of respondents

4.1.1 Socio-demographic background

Table 4.1 shows the distribution of respondents' socio-demographic background. The overall median (IQR) age of respondents was 21.00 (2.00), ranged from 18 until 30 years old. More than three quarters of them were female (88.5%) compared to male (11.5%). For race, most of the respondents were Malay (79.1%) followed by others which were consists of Iban, Kadazan, Bidayuh and many more (13.9%), Chinese (5.9%) and Indian (1.2%).

In terms of household income, the median (IQR) was 1.00 (0.00). Most were B40 category (77.0%) which had a household income of less than RM4850.00 compared to M40 category (13.0%) which earned between RM4851.00 - RM10970.00. The T20 category (10.0%) is the least among all the categories which the respondents have a household income of RM10971.00 and above.

Most of the respondents were single (99.1%) and have no children (99.4%) (median=0.00, IQR=0.00). As for educational level and year of study, most were enrolled in diploma (51.6%); third year (22.7%) followed by second year (21.5%) and first year (7.4%). Meanwhile for bachelor (48.3%); fourth year (20.6%) followed by second year (13.6%), third year (9.4%) and first year (4.7%).

Majority of the respondents stayed in campus (81.7%) while the rest (18.3%) stayed in rented room or house and also own house when they were answering the questionnaire.

Table 4.1: Distribution of respondents by socio-demographic background (N=339)

Variables	N	(%)	Median (IQR)
Age*			21.00 (2.00)
≤21	170	50.1	
>21	169	49.9	
Gender			-
Male	39	11.5	
Female	300	88.5	
Race			-
Malay	268	79.1	
Chinese	20	5.9	
Indian	4	1.2	
Others	47	13.9	
Household income**			1.00 (0.00)
B40 (≤RM4850.00)	261	77.0	
M40 (RM4851.00 - RM10970.00)	44	13.0	
T20 (≥RM10971.00)	34	10.0	

Variables	N	(%)	Median (IQR)
Marital status			-
Single	336	99.1	
Married	3	0.9	
No. of children***			0.00 (0.00)
No children	337	99.4	
Have children	2	0.6	
Current educational level and year of study			-
Diploma first year	25	7.4	
Diploma second year	73	21.5	
Diploma third year	77	22.7	
Bachelor first year	16	4.7	
Bachelor second year	46	13.6	
Bachelor third year	32	9.4	
Bachelor fourth year	70	20.6	
Type of residence			-
On campus	277	81.7	
Rented room or house	14	4.1	
Own house	48	14.2	

*Mean $\pm$ SD = 21.47 $\pm$ 1.78

** Mean $\pm$ SD = 1.33 $\pm$ 0.65

*** Mean $\pm$ SD = 0.01 $\pm$ 0.08

4.1.2 Academic performance

Table 4.2 shows the distribution of respondents' academic performance. Overall, half of the respondents got CGPA less than 3.50 (54.6%) while the median (IQR) was 3.50 (0.50). Most of the respondents had a total of current credit hour taken were less than 41 hours (54.0%) and study for less than 2 hours (54.9%), with median (IQR) were 41.00 (82.00) and 2.00 (1.00) respectively. Among of the respondents, most of them did academic discussion for 1-2 times per week (58.4%), followed by 3-4 times (23.3%) and more than 5 times (6.2%). In terms of amount of clinical placement that

had been taken, most were less than 10 weeks (67.0%) compared with above 10 weeks (33.0%). The median (IQR) for amount of clinical placement was 10.00 (29.00).

Table 4.2: Distribution of respondents by academic performance (N=339)

Variables	N	(%)	Median (IQR)
CGPA*			3.50 (0.50)
≤3.50	185	54.6	
>3.50	154	45.4	
Credit hours taken (cumulatively throughout study)**			41.00 (82.00)
≤41 hours	183	54.0	
>41 hours	156	46.0	
Duration of study and revision per day (hours)***			2.00 (1.00)
≤2 hours	186	54.9	
>2 hours	153	45.1	
Frequency of academic discussion (in a week)			-
None	41	12.1	
1-2 times	198	58.4	
3-4 times	79	23.3	
More than 5 times	21	6.2	
Amount of clinical placement throughout study (weeks)****			10.00 (29.00)
≤10 weeks	227	67.0	
>10 weeks	112	33.0	

* Mean ± SD = 3.13 ± 1.13

** Mean ± SD = 55.83 ± 42.95

*** Mean ± SD = 2.46 ± 1.08

**** Mean ± SD = 17.56 ± 18.72

4.1.3 Lifestyle factors

Table 4.3 shows the distribution of respondents' social lifestyle. As a whole, majority of the respondents were not smoking (98.8%) and did not consume alcohol (98.2%). Most of them practiced healthy lifestyle by being active in doing physical activity (82.3%). The highest frequency of physical activity was 1-2 times per week (59.3%), followed by 3-4 times (16.2%) and more than 5 times (6.8%) being the least. As for caffeine intake before sleep, most of the respondents did not take any caffeine at least 6 hours before sleep (77.6%). However, most of them were using their smartphone before they sleep (98.5%) for about an hour or less (70.5%).

Table 4.3: Distribution of respondents by lifestyle factors (N=339)

Variables	N	(%)	Median (IQR)
Smoking			-
Yes	4	1.2	
No	335	98.8	
Alcohol			-
Yes	6	1.8	
No	333	98.2	
Physical activity			-
Yes	279	82.3	
No	60	17.7	
Frequency of physical activity (in a week)			-
None	60	17.7	
1-2 times	201	59.3	
3-4 times	55	16.2	
More than 5 times	23	6.8	

Variables	N	(%)	Median (IQR)
Caffeine intake			-
Yes	76	22.4	
No	263	77.6	
Use of smartphone before sleep			-
Yes	334	98.5	
No	5	1.5	
Duration of smartphone usage before sleep (minutes)*			60.00 (90.00)
≤60 minutes	239	70.5	
>60 minutes	100	29.5	

* Mean ± SD = 71.46 ± 54.56

4.1.4 Stress

Table 4.4 shows the distribution of respondents' stress level. The overall mean score for stress was 20.72 ± 5.09 . Out of the 339 respondents, more than three-quarter had moderate level of stress (79.9%), followed by high level of stress (11.8%) and low level of stress (8.3%).

Table 4.4: Distribution of respondents by stress level (N=339)

Variables	N	(%)	Mean ± SD
Total stress score			20.72 ± 5.09
Low	28	8.3	
Moderate	271	79.9	
High	40	11.8	

Note: Low stress scores (0-13), moderate stress scores (14-26) and scores 27 and above presents high stress scores.

4.2 Prevalence of sleep quality

Table 4.5 shows the prevalence of sleep quality of the respondents. There were seven components of sleep quality which were subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleeping medication and daytime dysfunction.

For subjective sleep quality component, most of the respondents rated themselves to have fairly good sleep quality (56.9%) followed by fairly bad (26.3%), very good (10.9%) and very bad (5.9%).

In terms of sleep latency, 12.7% of the respondents were able to fall asleep within 15 minutes. A total of 33.0% of the respondents required about 16 to 30 minutes to sleep, as same like those who required 31 to 60 minutes. There were only 21.2% of them reported to have sleep latency more than 60 minutes.

Nearly half of the respondents had sleep duration about 6 to 7 hours per day (41.3%). About one quarter reported to have sleep duration between 5 to 6 hours per day while 19.5% had sleep duration less than 5 hours per day. Only 13.6% of respondents appeared to have sleep duration that was more than 7 hours per day.

As for habitual sleeping efficiency, there was a total of 68.1% of the respondents were sleep efficient due to higher sleep efficiency which was 85% and above compared to others. 16.5% of them reported to have 75-84% sleep efficiency, 8.6% had 65-74% sleep efficiency and less than 65% sleep efficiency was being the least with 6.8% of the respondents were reported.

Out of 339 respondents, more than half experienced sleep disturbances which was less than once a week (60.8%). There was approximately 32.2% of respondents who experienced sleep disturbance once or twice a week. Meanwhile, respondents who did not experience any sleep disturbance and those who experienced sleep disturbance three or more times a week shared similar percentage which was 3.5%.

On the other hand, majority of respondents did not take any sleeping medication (93.5%). A very small proportion of respondents reported to use sleeping medication which were less than once a week (2.9%), once or twice a week (2.4%) and three or more times a week (1.2%).

Most of the respondents were reported to have less than once a week for daytime dysfunction (55.5%). There were about 21.8% of them did not have any daytime dysfunction. Other than that, 19.5% of them suffered from daytime dysfunction once or twice a week while 3.2% were reported to be the least who suffered three or more times a week. In general, the median (IQR) for total PSQI score was 7.00 (4.00). The

overall prevalence of sleep quality was 27.1% for good sleep quality while 72.9% for poor sleep quality.

Table 4.5: Prevalence of sleep quality of the respondents (N=339)

Variables	N	(%)	Median (IQR)
Subjective sleep quality			-
Very good	37	10.9	
Fairly good	193	56.9	
Fairly bad	89	26.3	
Very bad	20	5.9	
Sleep latency			-
≤15 minutes	43	12.7	
16-30 minutes	112	33.0	
31-60 minutes	112	33.0	
>60 minutes	72	21.2	
Sleep duration			-
>7 hours	46	13.6	
6-7 hours	140	41.3	
5-6 hours	87	25.7	
<5 hours	66	19.5	
Habitual sleep efficiency			-
>85%	231	68.1	
75-84%	56	16.5	
65-74%	29	8.6	
<65%	23	6.8	
Sleep disturbance			-
Not during the past month	12	3.5	
Less than once a week	206	60.8	
Once or twice a week	109	32.2	
Three or more times a week	12	3.5	

Variables	N	(%)	Median (IQR)
Use of sleeping medication			-
Not during the past month	317	93.5	
Less than once a week	10	2.9	
Once or twice a week	8	2.4	
Three or more times a week	4	1.2	
Daytime dysfunction			-
Not during the past month	74	21.8	
Less than once a week	188	55.5	
Once or twice a week	66	19.5	
Three or more times a week	11	3.2	
Total PSQI score*			7.00 (4.00)
Good sleeper (≤ 5)	92	27.1	
Poor sleeper (> 5)	247	72.9	

* Mean $\pm$ SD = 7.46 $\pm$ 3.15

4.3 Association between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality

Table 4.6 shows the association between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality of the respondents. For age below than 21 years old, the prevalence of poor sleep quality was more than half (51.0%) compared to those who were 21 and above (49.0%). Female (89.1%) recorded the higher percentage of having poor sleep compared to male (10.9%). Based on ethnicity, the highest self-reported prevalence of poor sleep quality was Malay (79.8%), followed by Others (14.2%), Chinese (5.3%) and Indian (0.8%).

As for household income, the prevalence of poor sleep quality was found to be higher in low-income group. Those from B40 category which income were RM4850.00 and lower had highest prevalence of poor sleep quality (76.5%). Single (98.8%) respondents with no children (99.2%) were reported to have higher proportion of poor sleep quality compared to those for married and with children respectively.

In terms of educational level and year of study, nearly half of the respondents from diploma first year until third year had poor sleep quality (49.5%) while bachelor first year until fourth year gave a total proportion of more than half (50.7%) with poor sleep quality. On the other hand, most of the poor sleepers stayed on campus (80.6%).

For CGPA, most of the respondents who were having poor sleep quality had CGPA less than 3.50 (55.9%) compared to those with 3.50 and above (44.1%). The results found that respondents whom have taken more than 41 credits hours had higher prevalence of poor sleep quality (50.2%). Majority of respondents who self-study and did revision for a period of up to 2 hours per day had poor sleep quality (55.5%) compared to those above 2 hours (44.5%).

The highest proportion for frequency of academic discussion per week were 1-2 times (58.3%) had poor sleep quality compared to 3-4 times (21.1%) and more than 5 times (6.9%). A total of 65.6% of respondents were reported to have poor sleep

quality for those who experienced less than 10 weeks of clinical placement when they answering the questionnaire.

There were approximately 98.4% and 97.6% of respondents had poor sleep came from those who were not smoking and not consume alcohol respectively. Majority of respondents who did physical activity had higher prevalence of poor sleep quality (81.0%) compared to those who are not (19.0%). Highest prevalence of poor sleep quality was observed among respondents who did physical activity 1-2 times per week (60.3%).

As for caffeine consumption, there was higher proportion of poor sleep among those who did not take any caffeine at least 6 hours before sleep (73.3%). There were 98.4% of poor sleepers among respondents in this study used smartphone before sleep at night where those who used for an hour or less reported poor sleep quality (67.6%). The results reported that the respondents with moderate stress level had higher prevalence of poor sleep quality (80.2%) as compared to high stress level (14.6%) and low stress level (5.3%).

Based on Chi-Square result, there was a significant association between poor sleep quality and credit hour taken ($\chi^2=6.416$, $p=0.011$), caffeine intake ($\chi^2=9.684$, $p=0.002$) and total stress score ($\chi^2=15.841$, $p=0.000$). The percentage of poor sleep quality among those who cumulatively taken 41 credit hours and above was higher than those with below 41 credit hours. Highest percentage of poor sleep quality was seen

among those who did not consume any caffeine at least 6 hours before sleep at night and respondents with moderate stress level.

However, there was no significant association between poor sleep quality and age ($\chi^2=0.272$, $p=0.602$), gender ($\chi^2=0.294$, $p=0.588$), race ($\chi^2=2.138$, $p=0.524$), household income ($\chi^2=0.136$, $p=0.934$), marital status ($\chi^2=1.910$, $p=0.167$), number of children ($\chi^2=1.271$, $p=0.260$), current educational level and year of study ($\chi^2=6.646$, $p=0.355$) and type of residence ($\chi^2=0.809$, $p=0.667$). Other than that, current CGPA ($\chi^2=0.619$, $p=0.432$), amount of hour of study and revision ($\chi^2=0.132$, $p=0.717$), academic discussion ($\chi^2=2.390$, $p=0.122$), frequency of academic discussion ($\chi^2=4.777$, $p=0.189$) and amount of clinical placement ($\chi^2=0.777$, $p=0.378$) also not significant with poor sleep quality.

Furthermore, the other variables that were not significant with poor sleep quality were smoking ($\chi^2=2.551$, $p=0.110$), alcohol consumption ($\chi^2=3.839$, $p=0.050$), physical activity ($\chi^2=1.104$, $p=0.293$), frequency of physical activity ($\chi^2=3.278$, $p=0.351$), use of smartphone before sleep ($\chi^2=0.139$, $p=0.709$) and minutes of smartphone use before sleep ($\chi^2=3.656$, $p=0.056$).

Table 4.6: Association between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality of respondents (N=339)

Variables	Prevalence of sleep quality				χ^2	p-value	
	Good		Poor				
	N	(%)	N	(%)			
Age						0.272	0.602
≤21	44	47.8	126	51.0			
>21	48	52.2	121	49.0			
Gender						0.294	0.588
Male	12	13.0	27	10.9			
Female	80	87.0	220	89.1			
Race						2.138^	0.524^
Malay	71	77.2	197	79.8			
Chinese	7	7.6	13	5.3			
Indian	2	2.2	2	0.8			
Others	12	13.0	35	14.2			
Household income						0.136	0.934
B40 (≤RM4850.00)	72	78.3	189	76.5			
M40 (RM4851.00 - RM10970.00)	11	12.0	33	13.4			
T20 (≥RM10971.00)	9	9.8	25	10.1			
Marital status						1.910 ^a	0.167 ^a
Single	92	100.0	244	98.8			
Married	0	0.0	3	1.2			
No. of children						1.271 ^a	0.260 ^a
No children	92	100.0	245	99.2			
Have children	0	0.0	2	0.8			
Current educational level and year of study						6.646	0.355
Diploma first year	10	10.9	15	6.1			
Diploma second year	19	20.7	54	21.9			
Diploma third year	24	26.1	53	21.5			
Bachelor first year	4	4.3	12	4.9			
Bachelor second year	13	14.1	33	13.4			

Variables	Prevalence of sleep quality				χ^2	p-value
	Good		Poor			
	N	(%)	N	(%)		
Bachelor third year	10	10.9	22	8.9		
Bachelor fourth year	12	13.0	58	23.5		
Type of residence					0.809	0.667
On campus	78	84.8	199	80.6		
Rented room or house	3	3.3	11	4.5		
Own house	11	12.0	37	15.0		
CGPA					0.619	0.432
≤3.50	47	51.1	138	55.9		
>3.50	45	48.9	109	44.1		
Credit hours taken (cumulatively throughout study)					6.416	0.011*
≤41 hours	60	65.2	123	49.8		
>41 hours	32	34.8	124	50.2		
Duration of study and revision per day (hours)					0.132	0.717
≤2 hours	49	53.3	137	55.5		
>2 hours	43	46.7	110	44.5		
Frequency of academic discussion (in a week)					4.777	0.189
None	7	7.6	34	13.8		
1-2 times	54	58.7	144	58.3		
3-4 times	27	29.3	52	21.1		
More than 5 times	4	4.3	17	6.9		
Amount of clinical placement throughout study (weeks)					0.777	0.378
≤10 weeks	65	70.7	162	65.6		
>10 weeks	27	29.3	85	34.4		
Smoking					2.551 ^a	0.110 ^a
Yes	0	0.0	4	1.6		
No	92	100.0	243	98.4		
Alcohol					3.839 ^a	0.050 ^a
Yes	0	0.0	6	2.4		
No	92	100.0	241	97.6		

Variables	Prevalence of sleep quality				χ^2	p-value
	Good		Poor			
	N	(%)	N	(%)		
Physical activity					1.104	0.293
Yes	79	85.9	200	81.0		
No	13	14.1	47	19.0		
Frequency of physical activity (in a week)					3.278	0.351
None	13	14.1	47	19.0		
1-2 times	52	56.5	149	60.3		
3-4 times	19	20.7	36	14.6		
More than 5 times	8	8.7	15	6.1		
Caffeine intake					9.684	0.002*
Yes	10	10.9	66	26.7		
No	82	89.1	181	73.3		
Use of smartphone before sleep					0.139 ^a	0.709 ^a
Yes	91	98.9	243	98.4		
No	1	1.1	4	1.6		
Duration of smartphone usage before sleep (minutes)					3.656	0.056
≤60 minutes	72	78.3	167	67.6		
>60 minutes	20	21.7	80	32.4		
Total stress score					15.841	0.000*
Low	15	16.3	13	5.3		
Moderate	73	79.3	198	80.2		
High	4	4.3	36	14.6		

Note: (*) = Significant, $p < 0.05$

[^] Fisher exact test

^a Likelihood Ratio Value

4.4 Predictors of poor sleep quality

A simple logistic regression was carried out which detailed data is shown in Appendix 6. As shown in Table 4.7, there were only 2 variables that were retained in the final model which were caffeine intake and total stress score. The chances of getting poor sleep quality were 35.4% higher among respondents who did not consume caffeine at least 6 hours before sleep at night compared to those who consume caffeine (adjusted OR=0.354, 95% CI=0.172, 0.732, $p=0.005$). Besides, the chances of getting poor sleep quality were 3.006 times higher among respondents who had moderate stress level compared to low stress level (adjusted OR=3.006, 95% CI=1.348, 6.703, $p=0.007$), while for respondents who had high stress level was 9.542 times higher compared to low stress level (adjusted OR=9.542, 95% CI=2.640, 34.488, $p=0.001$).

The Hosmer-Lemeshow goodness of fitness test showed that the model was fit, as there was no significant difference ($p=0.942$) between the observed probability and the expected probability. Omnibus test was statistically significant which p -value less than 0.001 while the value for Cox & Snell $R^2 = 0.071$. Other than that, Nagelkerke R^2 value was 0.104. Therefore, this indicated 10.4% of the variation in poor sleep quality was explained by the logistics model.

Table 4.7: Predictors associated with the prevalence of poor sleep quality, multiple logistic regression (N=339)

Variables	Adjusted OR	Adjusted β	SE	Wald	95% CI (Lower, Upper)	p-value
Caffeine intake						
Yes	1.000					
No	0.354	-1.038	0.370	7.867	0.172, 0.732	0.005*
Total stress score						
Low	1.000					
Moderate	3.006	1.101	0.409	7.235	1.348, 6.703	0.007*
High	9.542	2.256	0.656	11.840	2.640, 34.488	0.001*

Model assumptions are met. There was no interaction and multicollinearity problems. Omnibus test was statistically significant ($X^2 = 25.142$, $df = 3$, $p < 0.001$). Cox & Snell $R^2 = 0.071$, Nagelkerke $R^2 = 0.104$. Overall percentage = 74.0%. Hosmer-Lemeshow goodness of fitness test shows the model was fit ($X^2 = 0.119$, $df = 2$, $p = 0.942$). Variable selection method = Forward (Likelihood Ratio); OR = Odd Ratio; SE = Standard Error; CI = Confidence Interval

*Variables significant with $p < 0.05$

CHAPTER 5

DISCUSSION

In an overview glance, sleep quality studies were generally carried out among medical students. Where this study had focus on nursing students, so the statistics could not be directly compared with previous studies that were carried out among the local contexts as local studies primarily on medical students. Thus, the prevalence of poor sleep quality in this study (72.9%) could not be directly compared to those studies that had been carried out in Malaysia such as studies from Said et al. (2020) and Ngu et al. (2017) which was 59.6% and 63.9% respectively. Based on curriculum for nursing program, it appeared that the medical program had much more intensive credit hours burden, requirements and others (Malaysian Nursing Board/Malaysian Midwives Board, 2018; Malaysian Medical Council, 2019). However, it looked like nursing students were the one who having more sleep quality problem.

As this study focused on homogenous population, the students in this context had same exposure. Thus, they had same background of study in Malaysia. However, in previous study, the study indicated that the respondents were from a broad range of different background of people, different range of age and different occupations. The one that was closely related to this study which had been conducted among nursing students were by Yildirim et al. (2020) in Turkey where he found the prevalence of

poor sleep quality was a quite close to the outcomes of this study (77.1%). Nevertheless, this study demonstrated a higher prevalence of poor sleep quality among nursing students compared to other studies done in different countries such as Portugal, Spain, Korea and United States (Silva et al., 2016, 63.2%; Blanco et al., 2020, 60.4%; Park et al., 2019, 69.6%; Zhang et al., 2018, 66.2%).

Based on the results, it appeared that socio-demographic background was not associated in general. Park et al. (2019) found opposite result from this study whereby age was significant to the sleep quality. Their age distribution ranged from 18 until 27 years old with age group of 20 years old. Meanwhile, this study included the respondents ranged from 18 until 30 years old and had age group of 21. In relations to gender, there had been abundance of evidences that showed that gender was not associated with sleep quality (Almojali et al., 2017; Safhi et al., 2020). Regardless of different population, the gender was an individual characteristic that was not play role in affecting sleep quality. Unfortunately, there was no published study that focusing on the association between race and sleep quality among nursing students. In general, race should not be affecting sleep quality because sleep quality was inherently depended upon genetics factors and other individual factors (Kingsbury et al., 2013).

While a local study by Said et al. (2020) indicated that household income and marital status was not statistically significant with sleep quality. This study had found similar outcome despite of being carried out among different populations which was nursing students. Descriptively, the first year of diploma and degree students had the least

prevalence of poor sleep quality compared to others. This might be due to the adaptation of students on how they cope with new environments and stressors because it would eventually lead to either good or poor sleep quality (Demir, 2017). The results of this study were contradicted with other studies which shown residence of respondents was significant to the sleep quality (Yildirim et al., 2020; Blanco et al., 2020).

As there was no significant difference between current CGPA and sleep quality, this result was consistent with a study conducted in Korea (Park et al., 2019). In addition to that, the CGPA group were also different in terms of cut of points used for analysis whereby they used parametric analysis instead of non-parametric analysis. Nursing students who had more than 41 hours credit taken cumulatively tend to have sleep difficulties compared to those who were less than 41 hours. This was could possibly to the first few years of nursing school are primarily theoretical, but as time goes on, the curriculum became considerably more practical, with a greater number of clinical credits (Blanco et al., 2020).

Descriptively, there was higher prevalence of nursing students who had poor sleep quality were study and did revision about less than 2 hours per day. Their study duration was not significant with sleep quality and had same outcome with a study involving medical students by Abdulghani et al. (2012) whereby they found studying hours was not statistically significant. However, it was not directly comparable due to the different population. Other than that, number of clinical placements throughout the study per weeks showed that more students were having poor sleep when they

had done the clinical about less than 10 weeks compared to above 10 weeks. Due to the nature of nursing students' clinical practice, their academic performance may be linked to their capability to adapt to the changes in their sleep cycles (Park et al., 2019).

In terms of local studies, one of the most recent studies was by Said et al. (2020), however it was not comparable because it had been conducted among medical students. Regardless, this study had shown that there were similarities across the findings of association specifically smoking and physical activity were not significant except for stress. Although stress was not significantly predicted poor sleep quality in their study, several international studies revealed that stress had been identified as significant predictor of poor sleep quality (Safhi et al., 2020; Almojali et al., 2017). All of them also found an association between stress and sleep quality in their studies. As an overall, those previous studies had shown that regardless of characteristics difference of the respondents, stress was associated with sleep quality. However, it was not directly comparable as mentioned before due to different study population which they had carried out among medical students.

In contrast, a study in Morocco reported that there was no significant difference between stress and sleep quality (El Hangouche et al., 2018). Despite of different study population, this might be due to the different instrument was used to measure stress level compared to this study whereby they used Kessler Psychological Distress Scale (K6). Furthermore, there was a possibility that the respondents' stress level could had been exacerbated by COVID-19 situation. This was due to the

implementation of online class and they had to learn from home. As for alcohol consumption, the results were not consistent with evidences from literature review which showed that alcohol consumption was associated with sleep quality among nursing students (Blanco et al., 2020; Yildirim et al., 2020). However, this study could not ascertain the association due to most of the respondents were non-smoker and non-alcoholic consumer.

Theoretically, caffeine had been shown to actually cause people difficult to fall asleep. This was due to the caffeine inhibited certain biochemicals in the brain to prevent from sleep. As a result, people had poor sleep quality. The results for caffeine intake in this study were not directly comparable to the study of Safhi et al. (2020) and Ibrahim et al. (2017) that had been carried out among medical students which they found that caffeine intake was significant with sleep quality. Although it was not comparable, this study had inconsistent results with Almojali et al. (2017) which identified that caffeine intake was not significantly predicted poor sleep quality. This present study was contradicted with a study by Zhai et al. (2020) regardless of different populations whereby they found that there was significant association between use of smartphone before sleep and sleep quality of Chinese college students in China. This could possibly due to when watching smartphone lights in bed, it could give adverse effect to the brain as well as negatively affecting sleep latency and leading to daytime dysfunction the next day while ignoring the disruptions that were caused by smartphone such as sound of a phone call or delivery of text message (Ahn & Kim, 2015).

CHAPTER 6

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

6.1 Conclusion

This study found a high prevalence of poor sleep quality among nursing students in Malaysia. It appeared that socio-demographic background did not affect sleep quality which was pretty much agreed by previous studies. In terms of social lifestyle, this study could not ascertain the association. This is due to most of the respondents were non-smoker and non-alcoholic consumer. It also demonstrated an association between sleep quality and credit hour taken, caffeine intake and stress. For predictors, this study revealed two important predictors that contributed to poor sleep quality which were caffeine intake and stress. Hence, measures need to be taken to reduce caffeine intake and stress level among nursing students.

6.2 Limitations

The major problem in the study is lack of information between stress and sleep quality among nursing students. The study between associations of these two variables is not much carried out due to lack of expertise. Many studies were conducted on medical students instead of nursing students. In Malaysia, there is no

study conducted among nursing students. Therefore, nursing students also should be taking into consideration since they are having quite similar with medical students in terms of stress and poor sleep quality.

There are few limitations in this study. Firstly, since this study was a cross-sectional study, the outcomes were unable to determine the direction of causality. Due to its nature, this study was unable to create a cause-effect relationship between stress and sleep quality. The cross-sectional design only can determine the statistical relationship which is to determine associations between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality among nursing students. Therefore, the association of stress and sleep quality does not prove causality.

The other limitation is the use of non-probability sampling method that restricted the findings' generalizability. This study used purposive sampling method to collect the data from respondents. Hence, the findings from this study could not be generalized to the general population of nursing students. Besides, there is a chance of recall bias to occur due to the use of self-administered questionnaires. Since the sleep measurement was based on people's subjective sleep records, the risks with this method of data collection were there might be occur recall bias among respondents during answering the questionnaire. Hence, it was highly relied on respondent's memory whether they forgot or not in order to provide information on stress and sleep quality during the past month.

6.3 Recommendations

As the current study design could not determine the causal effect of all the variables on sleep quality, future study by using longitudinal data analysis were needed to confirm the causation. Moreover, the causal consequences of the analysis can be investigated too. It is also should be used to clarify the causal relationships of the variables on sleep quality among nursing students. Therefore, it is required to have cohort study design in the further studies to identify and verify the determinants of poor sleep quality.

Other than that, a study design with larger sample size using probability sampling method should be conducted in the future. The sample size also should be comprised of different races in order to generalize the data at the nation level. The random selection from probability sampling method will generalize the data since strong statistical inferences on the whole group can be made. By using probability sampling method, the results are more accurate compared to non-probability sampling method.

Furthermore, it is recommended to use objective sleep assessment instead of subjective sleep assessment which was based on self-reports. By using objective sleep assessments, the occurrence of recall bias can be prevented. Subjective sleep assessment could underestimate or overestimate sleep quality due to psychological factors such as mood. Thus, objective sleep assessments such as polysomnography or

actigraphy should be used in the future research if the logistic and financial factors could make the measurements feasible.

For interventions, curriculum instructor should take into consideration of the result of this study for immediately improvement to overcome sleep quality problem. A promotional program must be conducted to improve the awareness among nursing students. Nursing education should include programs or workshops that focus on good sleep habits, learning coping mechanisms, and promoting mental health. Silva et al. (2016) stated that training of nursing students on sleep quality is crucial because it will affect their decision-making beside act as knowledge practitioners of healthy lifestyle habits especially as health professionals. Therefore, educating nursing students about the causes, signs and symptoms of depression and poor sleep as well as potential treatment options can help them recognize symptoms in themselves and seek help (Zhang et al., 2018).

Besides, caffeine intake also should be restricted at least 6 hours before sleep at night. Students must take this suggestion seriously by changing their routine or lifestyle to get better sleep quality. They also should plan their sleeping time as well. According to Zhang et al. (2018), it stated that one of the interventions is maintaining a sleep schedule and creating a routine to enhance sleep such as reducing caffeine after dinner. For instance, daily bedtimes as well as a more organized schedule of study timetable and extracurricular activities (Silva et al., 2016). Meanwhile, the other measures that can be implemented to improve sleep quality is keeping the room dark before bedtime, avoiding naps during the day, increasing exercise during the day,

incorporating time management techniques, practicing deep breathing exercises while stressed and practicing meditation.



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APPENDIX 1: QUESTIONNAIRE

Date/ Tarikh:



QUESTIONNAIRE / BORANG KAJI SELIDIK

RESEARCH TITLE/TAJUK KAJIAN:	STRESS AND SLEEP QUALITY AMONG NURSING STUDENTS IN MALAYSIA <i>STRES DAN KUALITI TIDUR DI KALANGAN PELAJAR KEJURURAWATAN DI MALAYSIA</i>
RESEARCHER NAME/NAMA PENGKAJI:	WAN MUHAMMAD AMIRUL BIN TUAN RAZALI

Instructions/Arahan

This questionnaire contains 4 sections only. Please answer all questions.
Borang kaji selidik ini mengandungi 4 bahagian sahaja. Sila jawab semua soalan.

1. Section A: Socio-demographic background and academic performance
Bahagian A: Latar belakang sosio-demografik dan prestasi akademik
2. Section B: Lifestyle factors
Bahagian B: Faktor gaya hidup
3. Section C: Perceived Stress Scale
Bahagian C: Persepsi Skala Stres
4. Section D: Pittsburgh Sleep Quality Index
Bahagian D: Indeks Kualiti Tidur Pittsburgh

Section A: Socio-demographic background
Bahagian A: Latarbelakang sosio-demografik

INSTRUCTIONS: Please tick your answer and fill in the blanks for the questions below.
ARAHAN: Sila tandakan jawapan anda dan isi jawapan di ruangan yang disediakan untuk soalan dibawah.

1. Age/Umur: _____

2. Gender/Jantina:

☐	Male/Lelaki
☐	Female/Perempuan

3. Races/Bangsa:

☐	Malay/Melayu
☐	Chinese/Cina
☐	Indian/India
☐	Others/Lain-lain

4. Household income/Pendapatan isi rumah: _____

5. Marital status/Status perkahwinan:

☐	Single/Bujang
☐	Married/Berkahwin
☐	Divorced/Berceraai

6. No. of children (Put 0 if you have no children)/Bilangan anak (Letakkan 0 jika anda tidak mempunyai anak): _____

7. Current educational level and year of study/*Tahap pendidikan semasa dan tahun pengajian:*

	Diploma first year/ <i>Tahun pertama diploma</i>
	Diploma second year/ <i>Tahun kedua diploma</i>
	Diploma third year/ <i>Tahun ketiga diploma</i>
	Bachelor first year/ <i>Tahun pertama ijazah sarjana muda</i>
	Bachelor second year/ <i>Tahun kedua ijazah sarjana muda</i>
	Bachelor third year/ <i>Tahun ketiga ijazah sarjana muda</i>
	Bachelor fourth year/ <i>Tahun keempat ijazah sarjana muda</i>

8. Type of residence/*Jenis tempat kediaman:*

	On campus/ <i>Kampus</i>
	Rented room or house/ <i>Bilik atau rumah sewa</i>
	Own house/ <i>Rumah sendiri</i>

Section B: Academic performance
Bahagian B: Prestasi akademik

INSTRUCTIONS: Please tick your answer and fill in the blanks for the questions below.
ARAHAN: Sila tandakan jawapan anda dan isi jawapan di ruangan yang disediakan untuk soalan dibawah.

1. What is your current CGPA (Put 0 if you are currently in semester 1 of first year)/

Apakah PNGK semasa anda? (Letakkan 0 jika anda berada di semester 1 tahun pertama): _____

2. How many credit hours that you have been taken cumulatively throughout the study?/Berapakah jam kredit yang telah anda ambil secara kumulatif sepanjang pengajian?: _____

3. What is the average time (in hours) you study and do revision per day?/Berapa lamakah purata tempoh waktu (dalam jam) anda belajar dan melakukan ulang kaji setiap hari?: _____

4. How frequently you do have academic discussions with lecturers and peers in a week?/Berapa kerapkah anda mengadakan perbincangan akademik dengan pensyarah dan rakan sebaya dalam seminggu? _____

	None/Tiada
	1-2 times/1-2 kali
	3-4 times/3-4 kali
	More than 5 times/Lebih daripada 5 kali

5. How long (in weeks) the amount of clinical placement that you ever had throughout the study? (Put 0 if never experience clinical placement)/Berapa lamakah (dalam minggu) jumlah penempatan klinikal yang pernah anda lakukan sepanjang pengajian? (Letakkan 0 jika tidak pernah melakukan penempatan klinikal): _____

Section C: Lifestyle factors
Bahagian C: Faktor gaya hidup

INSTRUCTIONS: Please tick your answer and fill in the blanks for the questions below.
ARAHAN: Sila tandakan jawapan anda dan isi jawapan di ruangan yang disediakan untuk soalan dibawah.

1. Do you currently smoke?/Adakah anda merokok?

☐

Yes/Ya

☐

No/Tidak

2. Do you currently consume alcohol?/Adakah anda mengambil minuman keras?

☐

Yes/Ya

☐

No/Tidak

3. Do you perform physical activity?/Adakah anda melakukan aktiviti fizikal?

☐

Yes/Ya

☐

No/Tidak

4. If yes, how frequently you do physical activity in a week? (i.e., 30 minutes per session)/Jika ya, berapa kerapkah anda melakukan aktiviti fizikal dalam seminggu? (i.e., 30 minit setiap sesi)

☐	1-2 times/1-2 kali
☐	3-4 times/3-4 kali
☐	More than 5 times/Lebih daripada 5 kali

5. Do you consume caffeine 6 hours before sleeping at night?/Adakah anda mengambil kafein 6 jam sebelum tidur pada waktu malam?

☐

Yes/Ya

☐

No/Tidak

6. Do you use phone before sleep?/Adakah anda menggunakan telefon sebelum tidur?

☐

Yes/Ya

☐

No/Tidak

7. If yes, how long (in minutes) do you use phone before sleep?/Jika ya, berapa lama (dalam minit) anda menggunakan telefon sebelum tidur?: _____

Section D: Perceived Stress Scale

Bahagian D: Persepsi Skala Stres

INSTRUCTIONS: The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

ARAHAN: Soalan berikut adalah mengenai perasaan dan pemikiran anda pada bulan lepas. Dalam setiap kes, sila nyatakan jawapan anda dengan menandakan bulat di atas skala yang mewakili beberapa kerap anda rasa atau fikir secara tertentu.

0 = Never/Tidak 1 = Almost Never/Hampir Tidak 2 = Sometimes/Kadang Kala
3 = Fairly Often/Hampir Kerap 4 = Very Often/Sangat Kerap

1. In the last month, how often have you been upset because of something that happened unexpectedly?
Dalam bulan lepas, berapa kerap anda berasa kecewa kerana sesuatu berlaku di luar jangkaan?

0 1 2 3 4
2. In the last month, how often have you felt that you were unable to control the important things in your life?
Dalam bulan lepas, berapa kerap anda berasa anda tidak boleh mengawal perkara-perkara yang penting dalam kehidupan anda?

0 1 2 3 4
3. In the last month, how often have you felt nervous and "stressed"?
Dalam bulan lepas, berapa kerap anda berasa gementar dan stres?

0 1 2 3 4
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
Dalam bulan lepas, berapa kerap anda berasa yakin dengan keupayaan anda untuk menangani masalah peribadi?

0 1 2 3 4
5. In the last month, how often have you felt that things were going your way?
Dalam bulan lepas, berapa kerap anda berasa perkara - perkara berlaku mengikut kehendak anda?

0 1 2 3 4

6. In the last month, how often have you found that you could not cope with all the things you had to do?
Dalam bulan lepas, berapa kerap anda mendapati bahawa anda tidak mampu menangani perkara yang perlu dilakukan?
- 0 1 2 3 4
7. In the last month, how often have you been able to control irritations in your life?
Dalam bulan lepas, berapa kerap anda dapat mengawal perasaan tidak selesa dalam hidup anda?
- 0 1 2 3 4
8. In the last month, how often have you felt that you were on top of things?
Dalam bulan lepas, berapa kerap anda berasa anda boleh mengawal / menguruskan semua cabaran yang diberikan?
- 0 1 2 3 4
9. In the past month, how often have you been angered because of things that were outside of your control?
Dalam bulan lepas, berapa kerap anda berasa marah ke atas perkara-perkara yang berada di luar kawalan anda?
- 0 1 2 3 4
10. In the past month, how often have you felt difficulties were piling up so high that you could not overcome them?
Dalam bulan lepas, berapa kerap anda berasa kesukaran yang bertimbun sehingga anda tidak mampu mengatasinya?
- 0 1 2 3 4

Section D: Pittsburgh Sleep Quality Index
Bahagian D: Indeks Kualiti Tidur Pittsburgh

INSTRUCTIONS: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

ARAHAN: Soalan-soalan berikut berkaitan dengan tabiat tidur anda pada kebiasaannya dalam tempoh sebulan yang lalu. Jawapan anda harus menggambarkan keadaan yang paling tepat bagi kebanyakan waktu siang dan malam anda dalam sebulan yang lalu. Sila jawab semua soalan.

1. During the past month, when have you usually gone to bed at night?

Dalam sebulan yang lalu, pada pukul berapa biasanya anda masuk tidur pada waktu malam?

Bed time/Jam tidur lazim _____

2. During the past month, how long (in minutes) has it usually take you to fall asleep each night?

Dalam sebulan yang lalu, berapa lamakah (dalam minit) biasanya diambil untuk anda lelap pada setiap malam?

Number of minutes/Bilangan minit _____

3. During the past month, what time have you usually gotten up in the morning?

Dalam sebulan yang lalu, pukul berapakah kebiasaannya anda bangun pada waktu pagi?

Getting up time/Jam bangun lazim _____

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spend in bed.)

Dalam sebulan yang lalu, berapa jumlah jam tidur sebenar yang anda biasa perolehi pada waktu malam? (Ini mungkin berbeza daripada bilangan jam yang anda luangkan di atas katil.)

Hours of sleep at night/Jumlah jam tidur dalam satu malam _____

INSTRUCTIONS: For each of the remaining questions, check the one best response. Please answer all questions.

ARAHAN: Bagi setiap soalan yang selebihnya, sila periksa respons yang terbaik. Sila jawab semua soalan.

5. During the past month, how often have you had trouble sleeping because you...(please tick $\checkmark$ on the appropriate answer)

Dalam sebulan yang lalu, berapa kerapkah anda mengalami masalah tidur kerana anda...(sila tanda $\checkmark$ pada jawapan yang berkenaan)

- a) Cannot get to sleep within 30 minutes/*Tidak boleh lelap dalam tempoh masa 30 minit*
- | | |
|---|-----|
| Not during the past month/ <i>Tidak pernah dalam sebulan lalu</i> | () |
| Less than once a week/ <i>Kurang daripada sekali seminggu</i> | () |
| Once or twice a week/ <i>Satu atau dua kali seminggu</i> | () |
| Three or more times a week/ <i>Tiga kali atau lebih seminggu</i> | () |
- b) Wake up in the middle of the night or early morning/*Terjaga di tengah malam atau awal pagi*
- | | |
|---|-----|
| Not during the past month/ <i>Tidak pernah dalam sebulan lalu</i> | () |
| Less than once a week/ <i>Kurang daripada sekali seminggu</i> | () |
| Once or twice a week/ <i>Satu atau dua kali seminggu</i> | () |
| Three or more times a week/ <i>Tiga kali atau lebih seminggu</i> | () |
- c) Have to get up to use the bathroom/*Perlu bangun tidur untuk ke tandas*
- | | |
|---|-----|
| Not during the past month/ <i>Tidak pernah dalam sebulan lalu</i> | () |
| Less than once a week/ <i>Kurang daripada sekali seminggu</i> | () |
| Once or twice a week/ <i>Satu atau dua kali seminggu</i> | () |
| Three or more times a week/ <i>Tiga kali atau lebih seminggu</i> | () |
- d) Cannot breathe comfortably/*Tidak boleh bernafas dengan selesa*
- | | |
|---|-----|
| Not during the past month/ <i>Tidak pernah dalam sebulan lalu</i> | () |
| Less than once a week/ <i>Kurang daripada sekali seminggu</i> | () |
| Once or twice a week/ <i>Satu atau dua kali seminggu</i> | () |
| Three or more times a week/ <i>Tiga kali atau lebih seminggu</i> | () |

e) Cough or snore loudly/*Batuk atau berdengkur dengan kuat*

Not during the past month/*Tidak pernah dalam sebulan lalu* ()

Less than once a week/*Kurang daripada sekali seminggu* ()

Once or twice a week/*Satu atau dua kali seminggu* ()

Three or more times a week/*Tiga kali atau lebih seminggu* ()

f) Feel too cold/*Berasa sangat sejuk*

Not during the past month/*Tidak pernah dalam sebulan lalu* ()

Less than once a week/*Kurang daripada sekali seminggu* ()

Once or twice a week/*Satu atau dua kali seminggu* ()

Three or more times a week/*Tiga kali atau lebih seminggu* ()

g) Feel too hot/*Berasa sangat panas*

Not during the past month/*Tidak pernah dalam sebulan lalu* ()

Less than once a week/*Kurang daripada sekali seminggu* ()

Once or twice a week/*Satu atau dua kali seminggu* ()

Three or more times a week/*Tiga kali atau lebih seminggu* ()

h) Had bad dreams/*Mengalami mimpi buruk*

Not during the past month/*Tidak pernah dalam sebulan lalu* ()

Less than once a week/*Kurang daripada sekali seminggu* ()

Once or twice a week/*Satu atau dua kali seminggu* ()

Three or more times a week/*Tiga kali atau lebih seminggu* ()

i) Have pain/*Mengalami kesakitan*

Not during the past month/*Tidak pernah dalam sebulan lalu* ()

Less than once a week/*Kurang daripada sekali seminggu* ()

Once or twice a week/*Satu atau dua kali seminggu* ()

Three or more times a week/*Tiga kali atau lebih seminggu* ()

j) Other reason(s), please describe/*Sebab-sebab lain, sila terangkan:*

Based on question 5 (j), how often during the past month have you had trouble sleeping because of this?

Berdasarkan soalan (j), berapa kerap pada bulan yang lalu, anda mempunyai masalah tidur kerana ini?

- Not during the past month/*Tidak pernah dalam sebulan lalu* ()
Less than once a week/*Kurang daripada sekali seminggu* ()
Once or twice a week/*Satu atau dua kali seminggu* ()
Three or more times a week/*Tiga kali atau lebih seminggu* ()

6. During the past month, how would you rate your overall sleep quality?

Dalam sebulan yang lalu, bagaimanakah anda menilai kualiti tidur anda secara keseluruhan?

- Very good/*Sangat baik* ()
Fairly good/*Agak baik* ()
Fairly bad/*Agak teruk* ()
Very bad/*Sangat teruk* ()

7. During the past month, how often have you taken medicine to help you sleep? (prescribed or over the counter)

Dalam sebulan yang lalu, berapa kerapkah anda mengambil ubat untuk membantu anda tidur? (ubat yang dinasihati oleh doktor atau ubat yang dibeli sendiri tanpa preskripsi)

- Not during the past month/*Tidak pernah dalam sebulan lalu* ()
Less than once a week/*Kurang daripada sekali seminggu* ()
Once or twice a week/*Satu atau dua kali seminggu* ()
Three or more times a week/*Tiga kali atau lebih seminggu* ()

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

Dalam sebulan yang lalu, berapa kerapkah anda mengalami masalah untuk berjaga semasa memandu kenderaan, makan atau ketika melibatkan diri dengan aktiviti sosial?

- | | |
|---|-----|
| Not during the past month/ <i>Tidak pernah dalam sebulan lalu</i> | () |
| Less than once a week/ <i>Kurang daripada sekali seminggu</i> | () |
| Once or twice a week/ <i>Satu atau dua kali seminggu</i> | () |
| Three or more times a week/ <i>Tiga kali atau lebih seminggu</i> | () |

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

Dalam sebulan yang lalu, adakah menjadi suatu masalah untuk anda kekal bersemangat dalam menyelesaikan kerja?

- | | |
|---|-----|
| No problem at all/ <i>Tiada masalah langsung</i> | () |
| Only a very slight problem/ <i>Sedikit bermasalah</i> | () |
| Somewhat of a problem/ <i>Agak bermasalah</i> | () |
| A very big problem/ <i>Masalah yang besar</i> | () |

If you need emotional support, try to calm down for a while and share the problem with your family member or friends that you trust. Feel free to contact university's counselor or visit the nearest clinic for medical attention. You can also visit this website to seek help.

<https://www.befrienders.org.my/>

Sekiranya anda memerlukan sokongan emosi, anda diminta untuk bertenang sebentar dan berkongsi masalah dengan ahli keluarga atau rakan yang anda percayai. Sila hubungi kaunselor universiti atau kunjungi klinik terdekat untuk mendapatkan rawatan perubatan. Anda juga boleh melayari laman web ini untuk meminta pertolongan.

<https://www.befrienders.org.my/>

Thank you/*Terima Kasih*

UNIVERSITI PUTRA MALAYSIA

Research title	: Stress and Sleep Quality Among Nursing Students in Malaysia.
Study Site	: Malaysia
JKEUPM Ref No.	: JKEUPM-2021-452
Researcher	: Wan Muhammad Amirul Bin Tuan Razali
Supervisor	: Assoc. Prof. Dr. Ng Yee Guan

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 25/6/2021
2. Respondent Information Sheet & Consent (English), Version 1 dated 25/6/2021
3. Respondent Information Sheet & Consent (Malay), Version 1 dated 25/6/2021
4. Proposal (English), Version 2 dated 13/9/2021
5. Questionnaire / Interview (English), Version 2 dated 13/9/2021
6. Questionnaire / Interview (Malay), Version 2 dated 13/9/2021
7. Curriculum Vitae of:
 - a. Assoc. Prof. Dr. Ng Yee Guan

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines.

Decision by JKEUPM:

- ☒ Approved
- ☒ **Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research**
- ☐ Disapproved

Please note that the approval is **VALID UNTIL 6 OCTOBER 2022**

Researchers should comply with the following:

- I. Complete a Study Final Report upon study completion (Form 3.2).
- II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.
- III. Applicable for Clinical Trial Studies and Clinical interventional Studies only: Progress Report has to be submitted to JKEUPM at every 6 months from the date of approval (Form 3.1). Report occurrences of all Serious Adverse Events (SAEs), Suspected Unexpected Serious Adverse Reaction (SUSARs) and Protocol Deviation/ Violation at all JKEUPM approved sites to JKEUPM. SAEs are to be reported within 15 calendar days from awareness of event by investigator. Initial report of SUSARs are to be reported as soon as possible but not later than 7

APPENDIX 3: RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM



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**JAWATANKUASA ETIKA UNIVERSITI UNTUK
PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA**

FORM 2.4: RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE :

Stress and sleep quality among nursing students in Malaysia

2. INTRODUCTION:

This study intends to determine the prevalence of stress and sleep quality among nursing students in Malaysia. Specifically, respondents' input on the Perceived Stress Scale (PSS) and Pittsburgh Sleep Quality Index (PSQI) are the main focus in this study.

This study would also intend to determine the association between socio-demographic background (age, gender, race, household income, marital status, number of children, educational level and year and type of residence), academic performance, lifestyle factors and stress with sleep quality among the nursing students in Malaysia. A total of 1355 respondents will be recruited for this online survey study.

3. WHAT WILL YOU HAVE TO DO?

This study is completely voluntary where respondents can withdraw at any point of time. Respondent is required to fill in their socio-demographic background in Section A of the questionnaire. This is followed by academic performance in Section B, lifestyle factors in Section C, stress assessment in Section D on the Perceived Stress Scale (PSS-10) and Pittsburgh Sleep Quality Index (PSQI) in section E. The questionnaire is estimated to take about 20 to 30 minutes.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

You should NOT participate in this study if you: _____

- a) Nursing students who are clinically diagnosed with psychiatric illnesses and having treatment for sleep problems or,
- b) Nursing students who deferred their studies (example: postpone semester, currently in progress to change program)

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

The input from respondents which is Malaysian nursing students who are susceptible to high level of stress due to various stressors will be able to help in order to make improvement on the treatment or prevention methods towards the other respondents who might have high stress level that could lead to poor sleep quality.

There will be no compensation or reward for your participation in this research. However, the collective/summarized results of this research can be obtained after the completion of this research at your request.

(b) TO THE INVESTIGATOR?

The investigator will be able to analyze data which can be used to determine the prevalence of stress and sleep quality and to determine the association between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality among nursing students in Malaysia. The result from this study can fill in the knowledge gap on stress and sleep quality especially among nursing students in Malaysia. The data from this study can be used to establish reference for future researcher who is interested to conduct this study.

6. WHAT ARE THE POSSIBLE RISKS?

There is a minimal risk as this research does not involve biological specimens.

Throughout the process of answering the questionnaire, you may experience a minimal psychosocial risk such as confusion when encounter difficulty in understanding the questions in the questionnaire using any electronic devices of your preference (i.e.: desktop, laptop, phone, tablet, etc.).

If you experienced any depression, anxiety, and stress symptoms, stop immediately from answering the questionnaire. You are encouraged to seek help from a counsellor or any organization that can provide mental support.

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

All information and identity that obtained through this research will remain confidential and used only for this research. The data processing software will not contain your personal identifier or information.

**8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE
OF THE RESEARCH?**

Dr Ng Yee Guan

Associate Professor

Dept. Of Environmental and Occupational Health,

Faculty of Medicine and Health Sciences

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Mobile No: +6019 277 1103

Email address: shah88zam@upm.edu.my

Wan Muhammad Amirul Bin Tuan Razali

Final Year Student

Department of Environmental and Occupational Health,

Faculty of Medicine and Health Sciences,

University Putra Malaysia.

Mobile No.: +601119124808

Email address: wanmuhammadamirulz@gmail.com

Please initial here if you have read and understood the contents of this page_____

9. CONSENT

I Identity Card No.
address.....
.....hereby voluntarily agree to take part in the research stated
above *(clinical /drug trial/video recording/ focus group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that I have the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

I* wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

* delete where necessary

Signature Signature
(Respondent) (Witness)
Date : Name :
I/C No. :

I confirm that I have explained to the respondent the nature and purpose of the above-mentioned research.

Date Signature
(Researcher)



BORANG 2.4: PENERANGAN DAN PERSETUJUAN RESPONDEN

Sila baca maklumat berikut dengan teliti. Sekiranya anda mempunyai sebarang pertanyaan, sila kemukakan kepada penyelidik.

1. TAJUK KAJIAN

Stres dan kualiti tidur di kalangan pelajar kejururawatan di Malaysia

2. PENGENALAN

Kajian ini bertujuan untuk menentukan hubungan antara stres dan kualiti tidur dalam kalangan pelajar kejururawatan di Malaysia. Secara khusus, input responden kepada *Persepsi Skala Stres (PSS)* dan *Indeks Kualiti Tidur Pittsburgh (PSQI)* adalah fokus utama dalam kajian ini.

Kajian ini juga bertujuan untuk menentukan hubungan antara latar belakang sosio-demografi (umur, jantina, bangsa, pendapatan isi rumah, status perkahwinan, bilangan anak, tahap pendidikan dan tahun dan tempat kediaman), prestasi akademik, faktor gaya hidup dan stres dengan kualiti tidur di kalangan pelajar kejururawatan di Malaysia. Sebanyak 1355 responden akan direkrut untuk kajian tinjauan dalam talian ini.

3. APAKAH YANG PERLU ANDA LAKUKAN?

Kajian ini sepenuhnya sukarela di mana responden boleh menarik diri pada bila-bila masa. Responden diminta untuk mengisi latar belakang sosiodemografi di Bahagian A soal selidik. Kemudian diikuti oleh prestasi akademik di Bahagian B, faktor gaya hidup di Bahagian C, penilaian stres dalam Bahagian D pada *Persepsi Skala Stres (PSS)* dan *Pittsburgh Sleep Quality Index (PSQI)* dalam Bahagian E. Soal selidik dianggarkan mengambil masa sekitar 20 hingga 30 minit.

4. SIAPA YANG TIDAK BOLEH MENYERTAI KAJIAN INI?

Anda TIDAK boleh mengambil bahagian dalam kajian ini sekiranya anda:

- Pelajar kejururawatan yang didiagnosis secara klinikal dengan penyakit psikiatri dan mendapat rawatan untuk masalah tidur atau,
- Pelajar kejururawatan yang menangguhkan pengajiannya (contoh: menangguhkan semester, sedang dalam proses pertukaran program)

5. APAKAH FAEDAH MENYERTA KAJIAN INI?

a) KEPADA ANDA SEBAGAI PESERTA?

Input daripada responden yang merupakan pelajar kejururawatan Malaysia yang terdedah kepada tahap stres yang tinggi disebabkan oleh pelbagai tekanan boleh membantu untuk membuat peningkatan kaedah rawatan atau pencegahan terhadap responden lain yang mungkin mempunyai tahap stres tinggi yang boleh menyebabkan kepada kualiti tidur yang buruk.

Tidak akan ada pampasan atau ganjaran untuk penyertaan anda dalam penyelidikan ini. Walau bagaimanapun, hasil / ringkasan dari penyelidikan ini dapat diperoleh setelah selesai penyelidikan ini atas permintaan anda.

b) KEPADA PENYELIDIK?

Penyelidik akan dapat menganalisis data yang dapat digunakan untuk menentukan kelaziman stres dan kualiti tidur dan untuk menentukan hubungan antara latar belakang sosio-demografi, prestasi akademik, faktor gaya hidup dan stres dengan kualiti tidur di kalangan pelajar kejururawatan di Malaysia. Hasil daripada kajian ini dapat mengisi jurang pengetahuan mengenai stres dan kualiti tidur terutama di kalangan pelajar kejururawatan di Malaysia. Data dari kajian ini dapat digunakan untuk membuat rujukan untuk penyelidik yang berminat untuk menjalankan kajian ini pada masa depan.

6. ADAKAH IA BERISIKO?

Terdapat risiko minimum kerana penyelidikan ini tidak melibatkan spesimen biologi.

Sepanjang proses menjawab soal selidik, anda mungkin mengalami risiko psikososial yang minimum seperti kekeliruan ketika menghadapi kesukaran dalam memahami soalan dalam soal selidik menggunakan sebarang alat elektronik pilihan anda (iaitu: komputer, komputer riba, telefon, tablet, dll.).

Sekiranya anda mengalami simptom kemurungan, kegelisahan, dan tekanan, segera berhenti menjawab soal selidik. Anda digalakkan untuk mendapatkan pertolongan dari kaunselor atau mana-mana organisasi yang dapat memberikan sokongan mental.

7. ADAKAH MAKLUMAT DAN IDENTITI SAYA KEKAL RAHSIA?

Semua maklumat dan identiti yang diperoleh melalui penyelidikan ini akan dirahsiakan dan hanya digunakan untuk penyelidikan ini. Perisian pemrosesan data tidak akan mengandungi pengenalan diri atau maklumat peribadi anda.

8. SIAPA YANG SAYA PERLU HUBUNGI SEKIRANYA SAYA MEMPUNYAI SOALAN TAMBAHAN

SEMASA MENGIKUTI PENYELIDIKAN INI?

Dr Ng Yee Guan
Professor Madya,
Jabatan Kesihatan Persekitaran dan Pekerjaan,
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Wan Muhammad Amirul Bin Tuan Razali
Pelajar Tahun Akhir
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No Telefon: +601119124808
E-mel: wanmuhammادميرulz@gmail.com

Sila tandatangan di sini sekiranya anda telah membaca dan memahami kandungan halaman ini _____

9. PERSETUJUAN

Saya..... No Kad Pengenalan.
beralamat.....

.....dengan ini bersetuju untuk mengambil bahagian secara sukarela dalam penyelidikan yang tersebut di atas *(kajian klinikal/percubaan ubat-ubatan/rakaman video/kumpulan sasaran/temuduga/ soal selidik).

Saya telah diberi penjelasan secara menyeluruh mengenai penyelidikan ini dari segi metodologi, risiko dan komplikasi (seperti tertulis pada Helaiian Penerangan Responden). Saya memahami bahawa saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa memberi sebarang alasan. Saya juga memahami bahawa sebarang maklumat yang berkaitan identiti saya akan dirahsiakan.

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang melibatkan saya.

Saya setuju/tidak bersetuju untuk imei/gambar/rakaman video/ rakaman suara digunakan dalam apa jua bentuk penerbitan atau pembentangan. (sekiranya berkaitan).

*potong yang tidak berkenaan

Tandatangan Tandatangan
(Responden) (Saksi)

Tarikh : Nama :
No. K/P:

Saya mengesahkan bahawa saya telah menerangkan kepada responden ini sifat dan tujuan penyelidikan yang tersebut di atas.

Tarikh Tandatangan
(Penyelidik)

APPENDIX 4: APPROVAL FOR INSTRUMENTATION (QUESTIONNAIRE)

 **sukhinder sandhu** <sukhyaki1@yahoo.com>
to me ▾ May 24, 2021, 1:30 PM ☆ ↶ ⋮

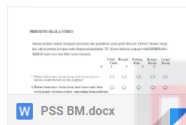
Dear Wan,

Attach is the PSS 10 in Malay.
Kindly acknowledged accordingly in your thesis/publications.

All the best.

Regards,

Sukhy



 **Gaisiorowski, Mary** <GaisiorowskiM@upmc.edu>
to me ▾ Sent on behalf of Dr. Buysse
Thu May 27, 2021, 9:55 AM ☆ ↶ ⋮

Dear Wan Muhammad Amirul Bin Tuan Razak,

You have my permission to use the PSQI for your research study. You can find the instrument, scoring instructions, the original article, links to available translations, and other useful information at www.sleep.pitt.edu under the Measures/Instruments tab. Please ensure that the PSQI is accurately reproduced in any on-line version (including copyright information). We request that you do cite the 1989 paper in any publications that result.

Note that Question 10 is not used in scoring the PSQI. This question is for informational purposes only, and may be omitted during data collection per requirements of the particular study.

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Good luck with your research.

Sincerely,

Daniel J. Buysse, M.D.
Professor of Psychiatry and Clinical and Translational Science
University of Pittsburgh School of Medicine
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3811 O'Hara St.
Pittsburgh, PA 15213
T: (412) 264-6413
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0000

 **Farah Fauzi** <norfarah@ukm.edu.my>
to me ▾ Fri, Jun 4, 2021, 1:54 PM ☆ ↶ ⋮

Walaikum salam wbt

Please find attached the PSQI-M. Would appreciate if you don't share this with others.
All the best in your study.

best w

DR. NOR FARAH MOHAMAD FAUZI
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APPENDIX 5: SAMPLE SIZE CALCULATION

One proportion formula is used to calculate the sample size. The prevalence of poor sleep quality among nursing students is selected from a study conducted by (Yildirim et al., 2020). With the precision of 5% and 95% confidence interval, the sample size is calculated as below.

$$n = \frac{Z_{1-\frac{\alpha}{2}}^2 P (1 - P)}{d^2}$$

Where,

$$Z_{1-\frac{\alpha}{2}}^2 = (1.96)^2$$

P= prevalence of poor sleep quality = 0.771

d= 0.05

$$\begin{aligned} n &= \frac{(1.96)^2 (0.771) (1 - 0.771)}{(0.05)^2} \\ &= 271 \end{aligned}$$

After considering non-response rate (20%) from a study by (Park et al., 2019) among nursing students. From that:

$$\frac{271}{\frac{20}{100}} = 1355$$

Therefore, the questionnaire used in this study must be distributed to at least 1355 students after 20% of non-response rate is considered.

Sample size calculation based on specific objectives

Objectives	Formula	Prevalence from previous study	Total sample size
To determine the prevalence of sleep quality among nursing students	$n = \frac{Z_{1-\frac{\alpha}{2}}^2 P (1 - P)}{d^2}$ $Z_{1-\frac{\alpha}{2}}^2 = (1.96)^2$ P= prevalence of poor sleep quality = 0.771 d= 0.05 $n = \frac{(1.96)^2(0.771)(1 - 0.771)}{(0.05)^2}$ $= 271$ After considering non-response rate (20%) from a study by (Park et al., 2019) among nursing students $\frac{271}{\frac{20}{100}} = 1355$	The reference prevalence is 77.1% on poor sleep quality among nursing students (Yildirim et al., 2020)	1355 students

Objectives	Formula	Prevalence from previous study	Total sample size
To determine the association between socio-demographic background, academic performance, lifestyle factors and stress with sleep quality among nursing students	$n = \frac{\left\{ z_{1-\frac{\alpha}{2}} \sqrt{2\bar{P}(1-\bar{P})} + z_{1-\beta} \sqrt{P_1(1-P_1) + P_2(1-P_2)} \right\}^2}{(P_1 - P_2)^2}$ Where, $Z_{1-\frac{\alpha}{2}} = 1.96$ $Z_{1-\beta} = 0.842$ $P = (0.744 + 0.561) / 2$ $= 0.6525$ $P_1 = 0.744$ $P_2 = 0.561$ $n = \frac{\{1.370759039 + 0.556448617\}^2}{0.033489}$ $= 111$ $N = 111 \times 2$ $= 222$ 20% non-response rate was considered (Park et al., 2019) $\frac{222}{\frac{20}{100}} = 1110$	The reference prevalence value is from study by (Safhi et al., 2020) P1: stress and poor sleep: 74.4% P2: not stress and poor sleep: 56.1%	1110 students

APPENDIX 6: SIMPLE LOGISTIC REGRESSION

List of predictors associated with the prevalence of poor sleep quality (N=339)

Variables	Crude OR	β	SE	Wald	95% CI (Lower, Upper)	p-value
Age						
≤21	1.000					
>21	0.880	-0.128	0.244	0.272	0.545, 1.421	0.602
Gender						
Male	1.000					
Female	1.222	0.201	0.371	0.293	0.591, 2.527	0.588
Race						
Malay	1.000					
Chinese	0.669	-0.401	0.489	0.675	0.257, 1.745	0.411
Indian	0.360	-1.021	1.010	1.022	0.050, 2.607	0.312
Others	1.051	0.050	0.362	0.019	0.517, 2.137	0.890
Household income						
B40 (≤RM4850.00)	1.000					
M40 (RM4851.00 - RM10970.00)	1.143	0.134	0.375	0.127	0.548, 2.382	0.722
T20 (≥RM10971.00)	1.058	0.057	0.413	0.019	0.471, 2.376	0.891
Marital status						
Single	1.000					
Married	6.09 x 10 ⁸	20.228	2.32 x 10 ⁴	0.000	0.000, 0.000	0.999
No. of children						
No children	1.000					
Have children	6.07 x 10 ⁸	20.223	2.84 x 10 ⁴	0.000	0.000, 0.000	0.999
Current educational level and year of study						
Diploma first year	1.000					
Diploma second year	1.895	0.639	0.488	1.717	0.729, 4.928	0.190*
Diploma third year	1.472	0.387	0.477	0.658	0.578, 3.747	0.417

Variables	Crude OR	β	SE	Wald	95% CI (Lower, Upper)	p-value
Bachelor first year	2.000	0.693	0.707	0.961	0.500, 7.997	0.327
Bachelor second year	1.692	0.526	0.523	1.011	0.607, 4.720	0.315
Bachelor third year	1.467	0.383	0.559	0.470	0.491, 4.384	0.493
Bachelor fourth year	3.222	1.170	0.517	5.123	1.170, 8.875	0.024*
Type of residence						
On campus	1.000					
Rented room or house	1.437	0.363	0.665	0.298	0.390, 5.290	0.585
Own house	1.318	0.276	0.368	0.563	0.640, 2.715	0.453
CGPA						
≤ 3.50	1.000					
> 3.50	0.825	-0.192	0.245	0.618	0.511, 1.333	0.432
Credit hours taken (cumulatively throughout study)						
≤ 41 hours	1.000					
> 41 hours	1.890	0.637	0.253	6.323	1.151, 3.105	0.012*
Duration of study and revision per day (hours)						
≤ 2 hours	1.000					
> 2 hours	0.915	-0.089	0.245	0.132	0.566, 1.479	0.717
Frequency of academic discussion (in a week)						
None	1.000					
1-2 times	0.549	-0.600	0.445	1.818	0.230, 1.312	0.178*
3-4 times	0.397	-0.925	0.478	3.744	0.155, 1.012	0.053*
More than 5 times	0.875	-0.134	0.694	0.037	0.225, 3.407	0.847
Amount of clinical placement throughout study (weeks)						
≤ 10 weeks	1.000					
> 10 weeks	1.263	0.234	0.265	0.776	0.751, 2.124	0.378
Smoking						
Yes	1.000					
No	0.000	-20.232	2.01×10^4	0.000	0.000, 0.000	0.999

Variables	Crude OR	β	SE	Wald	95% CI (Lower, Upper)	p-value
Alcohol						
Yes	1.000					
No	0.000	-20.240	1.64 x 10 ⁴	0.000	0.000, 0.000	0.999
Physical activity						
Yes	1.000					
No	1.428	0.356	0.340	1.096	0.733, 2.783	0.295
Frequency of physical activity (in a week)						
None	1.000					
1-2 times	0.793	-0.232	0.352	0.435	0.397, 1.581	0.509
3-4 times	0.524	-0.646	0.423	2.337	0.229, 1.200	0.126*
More than 5 times	0.519	-0.657	0.538	1.487	0.181, 1.490	0.223*
Caffeine intake						
Yes	1.000					
No	0.334	-1.095	0.365	9.029	0.164, 0.683	0.003*
Use of smartphone before sleep						
Yes	1.000					
No	1.498	0.404	1.125	0.129	0.165, 13.580	0.719
Duration of smartphone usage before sleep (minutes)						
≤60 minutes	1.000					
>60 minutes	1.725	0.545	0.287	3.605	0.983, 3.027	0.058*
Total stress score						
Low	1.000					
Moderate	3.130	1.141	0.403	8.018	1.421, 6.894	0.005*
High	10.385	2.340	0.649	12.998	2.910, 37.062	0.000*

Simple logistic regression was used to predict the predictors of the prevalence of poor sleep quality

OR = Odd ratio

SE = Standard error

CI = Confidence interval

*Variables significant with $p < 0.25$