THE ASSOCIATION BETWEEN PSYCHOLOGICAL DISTRESS, SLEEP QUALITY, AND NIGHT EATING SYNDROME (NES) AMONG UNDERGRADUATES IN UNIVERSITY TUNKU ABDUL RAHMAN (UTAR), KAMPAR CAMPUS.

By

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A project report submitted to the Department of Allied Health Science

Faculty of Science

University Tunku Abdul Rahman

In partial fulfilment of the requirements for the degree of

Bachelor of Science (Hons) Dietetics

May 2023

ABSTRACT

THE ASSOCIATION BETWEEN PSYCHOLOGICAL DISTRESS, SLEEP QUALITY, AND NIGHT EATING SYNDROME (NES) AMONG UNDERGRADUATES IN UNIVERSITY TUNKU ABDUL RAHMAN (UTAR), KAMPAR CAMPUS.

Chow Hor Yan

Night eating disorder (NES) is a 'disorder of delayed circadian food intake', an alarming eating disorder in Malaysia, typically among the university student population. It has been related to psychological distress like depression, anxiety and stress, and poor sleep quality, commonly found among university students. However, in Malaysia, there are still inadequate research studies. As a result, this study was conducted to study the association between NES, psychological distress, and sleep quality among university students. Two hundred and ten undergraduates were assessed in this cross-sectional study. The subjects were assessed through a self-administered questionnaire consisting of Night Eating Questionnaire (NEQ), Depression Anxiety Stress Scales 21 (DASS-21) and Pittsburgh Sleep Quality Index (PSQI). Spearman's rank correlation test was used to study the association between NES, psychological distress, and sleep quality among the subjects. The prevalence

of NES among the 210 subjects was 1.4%. Poor sleep quality, and psychological distress (depression, anxiety, stress) were prevalent at 47.66%, 30.5%, 39.1%, and 12.4%, respectively among the subjects. The result showed that NES was significantly associated with psychological distress and sleep quality. In conclusion, the prevalence of NES was low and found to be associated with psychological distress, and sleep quality among UTAR undergraduates in the Kampar campus. Early detection and management of mental health issues and sleep problems are required to prevent the development of NES.

ACKNOWLEDGEMENTS

First, I would like to express my deepest gratitude to my supervisor, Dr. Chang Sui Kiat, for his guidance and support throughout my research for the Final Year Project (FYP). Next, I sincerely appreciate all the participants for their time and corporation in the data collection process. I would also like to thank UTAR Scientific and Ethical Review Committee (U/SERC/209/2022) for the ethical approval. Lastly, I would like to sincerely thank my family, partner, seniors and coursemates for their support and warm encouragement throughout the journey.

DECLARATION

I hereby declare that this final year project report is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTAR or other institutions.

CHOW HOR YAN

APPROVAL SHEET

This final year project report entitled "**THE ASSOCIATION BETWEEN PSYCHOLOGICAL DISTRESS, SLEEP QUALITY, AND NIGHT EATING SYNDROME (NES) AMONG UNDERGRADUATES IN UNIVERSITY TUNKU ABDUL RAHMAN (UTAR), KAMPAR CAMPUS**" was prepared by CHOW HOR YAN and submitted as partial fulfilment of the requirements for the degree of Bachelor of Science (Hons) Dietetics at Univeristi Tunku Abdul Rahman.

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PERMISSION SHEET

It is hereby certified that **CHOW HOR YAN** (ID No: **19ADB04314**) has completed this final year project report entitled "**THE ASSOCIATION BETWEEN PSYCHOLOGICAL DISTRESS, SLEEP QUALITY, AND NIGHT EATING SYNDROME (NES) AMONG UNDERGRADUATES IN UNIVERSITY TUNKU ABDUL RAHMAN (UTAR), KAMPAR CAMPUS**" under the supervision of Dr. Chang Sui Kiat from the Department of Allied Health Science, Faculty of Science.

I hereby give permission to the University to upload the softcopy of my final year project report in pdf format into the UTAR Institutional Repository, which may be made accessible to the UTAR community and the public.

Yours truly,

(CHOW HOR YAN)

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LIST OF ABBREVIATIONS

DASS-21	Depression Anxiety Stress Scales 21
DSM-V	Statistical Manual of Mental Disorders
NEQ	Night Eating Questionnaire
NES	Night Eating Syndrome
OSFED	Other Specific Feeding or Eating Disorders
PSQI	Pittsburgh Sleep Quality Index
SPSS	IBM Statistical Package for the Social Sciences
SQ	Sleep Quality
UTAR	Universiti Tunku Abdul Rahman

Chapter 1

INTRODUCTION

1.1 Background

Eating disorders are becoming alarming health issues and are highly prevalent among university students globally. In Malaysia, a recent report shows that about 14% of university students were at risk of eating disorders (Chan, et al, 2020). With prodigious efforts, night eating syndrome (NES) was defined. NES is a 'disorder of delayed circadian food intake' categorized under 'Other Specific Feeding or Eating Disorders (OSFED) (Allison, et al., 2010; Allison and Berner, 2013). Around 1.1% to 1.5% of the general population was affected by NES; however, the prevalence of NES in the young adult population was alarmingly high (Sevincer, et al., 2016). Two studies reported that the prevalence of NES in university students was 2.4% and 12.2% (He, et al., 2017; Gan, Chin and Law, 2019). There were potential factors that influenced the development of NES in this population, not limited to physical or psychological alterations from late adolescence to early adulthood, unhealthy dietary habits, normalized lifestyle (e.g., staying up late to complete assignments), sleep disturbance and stress from academic performance, peers or career uncertainty (Wichianson, et al., 2009; Nolan and Geliebter, 2012; Sevincer, et al., 2016; Borges, Figueiredo and do Souto, 2017; Gan, Chin and Law, 2019; Dzulkafli, et al., 2020; Miraj, et al., 2022).

1.2 Problem Statements

NES is becoming an alarming eating disorder in Malaysia, typically the university student population (Sarina and Poh, 2015; Gan, Chin and Law, 2019). Psychological distress and poor sleep quality are commonly reported in university students (Say and Lai, 2013; Lemma, et al, 2012; Gan, Chin and Law, 2019), which found to be linked to NES (Fischer, et al., 2012; Nolan and Geliebter, 2012; Cleator, et al., 2013; Sevincer, et al., 2016; Borges, Figueiredo and do Souto, 2017; He, et al., 2017; Gan, Chin and Law, 2019; Miraj, et al., 2022). Despite several studies on the risk factors towards NES among undergraduate students in different contexts, there were still inadequate research studies in Malaysia. As a result, this study was carried out to study the association between NES, psychological distress, and sleep quality among university students in Malaysia.

1.3 Significance of Study

This study aims to determine the association between NES, psychological distress, and sleep quality. The prevalence of NES among the UTAR undergraduates in Kampar Campus will be assessed. Furthermore, this study can raise awareness of this eating disorder among university students while also contributing additional information for future intervention in managing or preventing the further development of NES or other related health issues. The findings can also assist clinicians and researchers in investigating the risk factors or complications of NES.

1.4 Objectives

1.4.1 General Objective

This research project aims to determine the association between psychological distress, sleep quality, and night eating syndrome (NES) among the UTAR undergraduates at Kampar Campus.

1.4.2 Specific Objectives

1. To determine the prevalence of NES among UTAR undergraduates.
2. To determine sleep quality and its association with NES.
3. To determine psychological distress (depression, anxiety, stress) and its association with NES.
4. To determine the association between psychological distress, sleep quality, and NES.

1.5 Hypothesis

1.5.1 Null Hypothesis (H_0)

1. There is no association between sleep quality and NES among UTAR undergraduates at Kampar Campus.
2. There is no association between psychological distress and NES among UTAR undergraduates at Kampar Campus.
3. There is no association between psychological distress, sleep quality, and NES among UTAR undergraduates at Kampar Campus.

1.5.2 Alternative Hypothesis (H_1)

1. There is an association between sleep quality and NES among UTAR undergraduates at Kampar Campus.
2. There is an association between psychological distress and NES among UTAR undergraduates at Kampar Campus.
3. There is an association between psychological distress, sleep quality, and NES among UTAR undergraduates at Kampar Campus.

Chapter 2

LITERATURE REVIEW

2.1 Night Eating Syndrome (NES)

In 1955, the first definition of NES as a condition characterised by nocturnal hyperphagia, sleeplessness, and morning anorexia was made (Stunkard, Grace and Wolff, 1955). Subsequently, in 2010, it was described as a "disorder of delayed circadian intake of food" and characterized by “the ingestion of at least one-quarter of the total daily caloric intake after the evening meal and/or at least two episodes of nocturnal eating per week” (Allison, et al., 2010). It is currently categorized under ‘Other Specific Feeding or Eating Disorders (OSFED)’ in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) by the American Psychological Association (Allison and Berner, 2013).

To be diagnosed with NES, an individual should meet at least one of the primary criteria: consuming at least 25% of their daily calories after their evening meal or having two or more episodes of nocturnal eating per week (Allison, et al., 2010). In addition, they must meet a minimally three of the following criteria: (i) having no appetite in the morning, (ii) feeling strong cravings after dinner and before bed, (iii) suffering from insomnia at a minimum of four nights weekly, (iv) believing eating is a necessity for sleep, and (v) experiencing a depressive or worsening mood during the evening or night (Allison, et al., 2010). To differentiate NES from another similar eating disorder, namely sleep-related eating disorder (SRED), the individual

with NES must be aware of and able to recall their present nocturnal eating (Allison, et al., 2010; Milano, et al., 2012). They must also encounter distress or functional impairment and persist in these disordered eating patterns for at least three months (Allison, et al., 2010). Although some individuals with NES tend to have binge eating behaviour, it is still different from binge eating disorder (BED) as they have different binge eating frequencies and times (Milano, et al., 2012). Individuals with NES mostly have high food intake at night and do not always binge eat, whereas, for those with BED, binge eating can happen any time of the day (Milano, et al., 2012; Abbott, et al., 2018).

Although its pathophysiology was still unclear, according to its characteristics, NES is a disorder with a mixture of eating, sleeping and emotional disruption (Milano, et al., 2012). This is found that individuals with NES are more prone to have psychological or sleeping issues, while individuals with these issues are more prone to develop NES as well (Yahia, et al., 2017; Akdevelioglu, Sahin and Yesidemir, 2020; Gundogdu, 2022).

2.2 Prevalence of NES among University Students

According to the National Institute of Mental Health, nearly 2 in every 100 individuals in the general population and equally common in both genders were found to be affected by NES (Sevincer, et al., 2016; Miraj, et al., 2022). However, recent studies as shown in Table 2.1 suggested that NES among university students was more prevalent than the general population. Thus, the presence of NES has become a big concern as the prevalence has increased over the years and has become a common eating disorder among this population (Gan, Chin and Law, 2019). Two studies from the United States showed a significant increase in NES prevalence from 5.69% to 12.3% from 2012 to 2017 (Nolan and Geliebter, 2012; Yahia, et al., 2017). Besides, studies from Turkey and Brazil showed a high prevalence of NES at 9.5% and 15% (Sevincer, et al., 2016; Borges, Figueiredo and do Souto, 2017). Meanwhile, a high prevalence of NES was also reported in Malaysia, ranging from 12.2% to 38.6% (Sarina and Poh, 2015; Gan, Chin and Law, 2019; Kwan, Lee, and Cheng, 2021), although Dzulkafi, et al. (2020) reported a low prevalence of 4.2%. The low prevalence occurred possibly because only female subjects were involved in the study, as males were more likely to develop NES than females (Gan, Chin and Law, 2019). Besides, as most females were conscious of excessive intake, body weight, and body image, they were more prevented from NES (Gan, Chin and Law, 2019).

Table 2.1: List of the prevalence of NES among university students in different regions.

Author, Year	Location, Subject	Prevalence
	Other Countries	
Nolan and Geliebter, 2012	United States 246 University Students	5.69%
Runfola, et al., 2014	United States 1,636 University Students	2.9%
Sevincer, et al., 2016	Turkey 210 University Students	9.5%
Borges, Figueiredo and do Souto, 2017	Brazil 200 Private University Students	15.0%
He, et al., 2017	China 849 College Students	2.4%
Yahia, et al., 2017	United States 413 Undergraduate Students	12.3%
Shakeel, et al., 2019	Saudi Arabia 300 Undergraduate Medical Students	10.3%
	Malaysia	
Sarina and Poh, 2015	Selangor 124 Public and Private University Students	23.4%
Gan, Chin and Law, 2019	Selangor 270 Public University Students	12.2%
Dzulkafi, et al., 2020	Kuantan 120 Female Public University Students	4.2%
Kwan, Lee, and Cheng, 2021	Selangor 166 Private University Students	38.6%

2.3 Psychological Distress and NES

Psychological distress such as depression, anxiety and stress are often high among university students. It may be due to heavy academic workload, examinations or grades, low leisure time, future uncertainties, concerns about meeting others' expectations, social activities engagements, dysfunctional relationships, excessive social media usage, financial difficulties, etc., (Ramón-Arbués, et al., 2020; Rahmatullah and Zhao, 2020; Mofatteh, 2021). Psychological factors, including psychological distress, can significantly contribute to the development of NES (Borges, Figueiredo, and do Souto, 2017). As university students are prone to exposed to psychological distress, the development of NES is greatly favoured (Borges, Figueiredo, and do Souto, 2017). Several studies have suggested a significant association between psychological distress and NES among university students (Sevincer, et al., 2016; Borges, Figueiredo and do Souto, 2017; He, et al., 2017; Gan, Chin and Law, 2019). These findings suggest that psychological distress may contribute to the development of NES.

Table 2.2: List of the association between psychological distress and NES in different regions.

Author, Year	Results
Sevincer, et al., 2016	Depression-NES ($r = 0.38$, $p < 0.001$**) [a] Anxiety-NES ($r = 0.42$, $p < 0.001$**) [a]
Borges, Figueiredo and do Souto, 2017	Depression-NES ($p = 0.0001$**) [c] Anxiety-NES ($p = 0.0001$**) [c] Stress-NES ($p = 0.0218$**) [c]
He, et al., 2017	Depression-NES ($r = 0.471$, $p < 0.001$**) [a] Anxiety-NES ($r = 0.456$, $p < 0.001$**) [a] Stress-NES ($r = 0.396$, $p < 0.001$**) [a]
Gan, Chin and Law, 2019	Depression-NES ($x^2 = 4.509$, $p = 0.204$) [b] Anxiety-NES ($x^2 = 4.451$, $p = 0.217$) [b] Stress-NES ($x^2 = 9.700$, $p = 0.021$*) [b]
Gundogdu, 2022	Depression-NES ($r = 0.538$, $p < 0.01$**) [a] Anxiety-NES ($r = 0.457$, $p < 0.01$**) [a] Stress-NES ($r = 0.525$, $p < 0.01$**) [a]

Note. [a] Pearson Correlation Test; [b] Chi-square Test; [c] Kruskal-Wallis Test.

*Note. * is significant at the 0.05 level. ** is significant at the 0.01 level.*

2.4 Sleep Quality and NES

Poor sleep quality is commonly prevalent in the university student population. Many possible factors like heavy academic workload, demanding academic performance, unhealthy lifestyle, high internet or social media usage, minimal parental supervision, stress, and social activities engagements can highly contribute to poor sleeping behaviour and quality, restlessness, or sleep disruption (Say and Lai, 2013; Seun-Fadipe and Mosaku, 2017). Sleep quality is critical in regulating eating behaviours through hormone levels. Leptin and ghrelin hormones are strongly linked to satiety and hungriness, respectively (Akdevelioglu, Sahin and Yesidemir, 2020). Insufficient sleep can elevate ghrelin levels and lower leptin levels, promoting hunger and appetite (Akdevelioglu, Sahin and Yesidemir, 2020). This may increase the likelihood of night eating, typically because staying awake longer leads to greater eating opportunities (Akdevelioglu, Sahin and Yesidemir, 2020). On the other hand, as the digestive process of a large meal requires energy and time, night eating can greatly increase the likelihood of sleep disruptions. A significant strong positive correlation between sleep quality and NES was reported by Cleator, et al. (2013). The severity of NES severity was found to be positively associated with the severity of poor sleep quality (Person, 2014). Similarly, NES students were more likely to experience shorter sleep duration than non-NES students (Yahia, et al., 2017). These findings suggest that delayed eating rhythm can interrupt sleep and cause poor sleep quality (Person, 2014).

Table 2.3: List of the association between sleep quality and NES in different regions.

Author, Year	Results
Cleator, et al., 2013	Sleep Quality-NES ($r = 0.540$, $p < 0.001$**) [a]
Yahia, et al., 2017	Sleep Quality-NES ($p = 0.007$**) [d]
Gan, Chin and Law, 2019	Sleep Quality-NES ($x^2 = 16.394$, $p < 0.001$**) [b]
Akdevelioglu, Sahin and Yesidemir, 2020	Sleep Quality-NES ($x^2 = 14.863$, $p < 0.001$**) [b]
Kwan, Lee, and Cheng, 2021	Sleep Quality-NES ($r = 0.31$, $p < 0.001$**) [a]
Gundogdu, 2022	Sleep Quality-NES ($r = 0.341$, $p < 0.01$**) [a]

Note. [a] *Pearson Correlation Test;* [b] *Chi-square Test;* [d] Student's independent *t-test.*
*Note. ** is significant at the 0.01 level.*

2.5 Psychological Distress and Sleep Quality

Academic burdens, feelings of future uncertainties, peers pressure, social activities engagements, dysfunctional relationships, excessive social media usage, minimal parental supervision, irregular sleep schedule, unhealthy lifestyle and financial burden are commonly found among university students (Seun-Fadipe and Mosaku, 2017; Rezaei, Khormali and Akbarpour, 2018; Ramón-Arbués, et al., 2020; Rahmatullah and Zhao, 2020; Mofatteh, 2021). These factors can contribute to this population's increased prevalence of psychological distress and poor sleep quality (Seun-Fadipe and Mosaku, 2017; Rezaei, Khormali and Akbarpour, 2018). Insomnia is also a common issue among university students that can increase the severity of psychological distress while also tending to be worsened by psychological distress (Rezaei, Khormali and Akbarpour, 2018). Recent studies

showed a moderate to strong relationship between sleep quality and psychological distress (Seun-Fadipe and Mosaku, 2017; Rezaei, Khormali and Akbarpour, 2018; Gundogdu, 2022).

Table 2.4: List of the association between psychological distress and sleep quality in different regions.

Author, Year	**Results**
Seun-Fadipe and Mosaku, 2017	Depression-SQ ($x^2 = 25.67$, $p < 0.01$**) [b] Anxiety-SQ ($x^2 = 43.35$, $p < 0.01$**) [b] Psychological Distress-SQ ($x^2 = 56.90$, $p < 0.01$**) [b]
Rezaei, Khormali and Akbarpour, 2018	Depression-SQ ($p < 0.001$**) [d] Anxiety-SQ ($p < 0.001$**) [d] Stress-SQ ($p < 0.001$**) [d]
Gundogdu, 2022	Depression-SQ ($r = 0.399$, $p < 0.01$**) [a] Anxiety-SQ ($r = 0.479$, $p < 0.01$**) [a] Stress-SQ ($r = 0.377$, $p < 0.01$**) [a]

Note. [a] Pearson Correlation Test; [b] Chi-square Test; [d] Student's independent *t-test. SQ=sleep quality.*
*Note. ** is significant at the 0.01 level.*

Chapter 3

METHODOLOGY

3.1 Study design

A descriptive, cross-sectional study on the association between NES, psychological distress and sleep quality was performed at Universiti Tunku Abdul Rahman (UTAR) from 1st January 2022 to 18th February 2023. The presence of NES, psychological distress, and sleep quality of undergraduates in UTAR, Kampar Campus was assessed through self-administered online questionnaires.

3.2 Study population

3.2.1 Sample Size

The sample size was calculated using the formula from Daniel (1999).

The formula was: $n = \frac{Z^2 P(1-P)}{d^2}$, where n = sample size; Z = 1.96 (with a confidence level of 95%); d = 5% (precision); P = expected prevalence or proportion. The expected prevalence of NES was obtained from Gan, Chin and Law (2019).

NES (12.2%): $n = \frac{1.96^2(0.122)(1-0.122)}{0.05^2} = 164.6 \approx 165$

An additional 20% of subjects was included to account for non-response and missing data. Hence the final minimum sample size of N=200 was determined for this study.

3.2.2 Inclusion criteria

Undergraduates aged between 18 to 25 years old who were currently pursuing their full-time degree at UTAR, Kampar Campus were eligible to participate in the study.

3.2.3 Exclusion criteria

Individuals who were currently pregnant, or suffering from any illnesses or physical disabilities were excluded from the study. Any individuals who were pursuing their foundation, diploma, postgraduate study or studying at other campuses or universities were also excluded from the study.

3.2.4 Ethical consideration

This study was carried out in compliance with the Personal Data Protection Act 2010 ("PDPA") and approval from the UTAR Scientific and Ethical Review Committee (U/SERC/209/2022) (Appendix A). Each participant was given an informed consent form after reading the study's purpose and was notified that they could withdraw their agreement to participate at any moment (Appendix B).

3.3 Research Instruments

3.3.1 Questionnaire Description

The online survey utilised in this study was derived from Allison et al. (2008), Lovibond et al. (1995), and Buysee et al. (1989). No pilot study was carried out in this study as the adapted questionnaires had already been validated by other researchers previously (Gan, Chin and Law, 2019). The final self-administrated questionnaire comprised four sections with a total of 53 questions (Appendix C). Section A consisted of 5 questions for socio-demographic information, section B consisted of 17 questions for NES assessment, section C consisted of 21 questions for psychological distress, and section D consisted of 10 questions for sleep quality assessment.

3.3.2 Socio-demographic Questionnaire

This questionnaire was self-developed and divided into dichotomous and multiple-choice questions. The information on the subjects' gender, age, faculty, campus, and year of study was obtained.

3.3.3 Night Eating Questionnaire (NEQ)

The presence of NES was assessed and determined by NEQ (Allison, et al., 2008). The behavioural and psychological syndrome of NES was able to be assessed through the 17 items of the questionnaire, where 4 items addressed the loss control and intensity of cravings, over-eating during the night and before bed; 3 items addressed the mild to moderate insomnia; 3 items related to the frequency of night eating; 2 items addressed morning appetite reduction; 2 items addressed for mood; 1 item related to the belief of the necessity of eating in order to sleep; 1 item related to the awareness over these feeding episodes. Questions 1 to 9 were required to be answered by all subjects, whereas questions 10 to 12 and 13 to 17 were only answered by subjects who did not obtain a 0 score on question 9 and question 12, respectively. The items were rated on a 5-point Likert scale. The global score (ranging from 0 to 52) was the sum of items 1 to 12 and item 14, which 25 or more scores indicating the presence of NES. Items 1, 4, and 14 were scored reversely. Whereas items 13, 15, 16 and 17 were excluded from the global score as item 13 was to screen for parasomnia, Nocturnal Sleep-Related Eating Disorder (NS-RED); item 15 was to reassure the symptoms had been carried on at a minimum of 3 months; items 16 and 17 were to identify the occurrence of distress.

3.3.4 Depression Anxiety Stress Scales 21 (DASS-21)

The Depression Anxiety Stress Scales 21 (DASS-21) was used to assess the psychological states, namely depression, anxiety, and stress among the subjects (Lovibond, et al., 1995). It consisted of 21 items, with seven items, for each psychological state. The rating of items was on a 4-point Likert scale. The sum of all relevant items was multiplied by two to determine the scoring for each component, ranging from 0 to 42. The subjects were classified according to their severity level in Table 3.1, namely normal, mild, moderate, severe, and extremely severe.

Table 3.1: Classification of psychological distress.

	Depression	**Anxiety**	**Stress**
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	≥ 28	≥ 20	≥ 34

3.3.5 Pittsburgh Sleep Quality Index (PSQI)

The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep quality among the subjects (Buysee, et al., 1989). The questionnaire consisted of 10 questions that contributed to the seven components: the latency of quality sleep, the duration of sleep duration, the efficiency of habitual sleep, sleep disturbances, sleeping medication usage and daytime dysfunction. The rating of items was on a 4-point Likert scale. The global score (ranging from 0 to 21) was the sum of seven component scores, which 5 or fewer scores indicating good sleep quality, else poor sleep quality.

3.4 Data Collection

The questionnaires with informed consent (Appendix B) were distributed among UTAR students via email, Microsoft Teams, WhatsApp, Facebook, and Instagram. Within the time frame of the data collection, 227 responses were collected. However, 17 responses were excluded due to not fitting the inclusion criteria of undergraduates studying on the Kampar campus (n=14) and incomplete questionnaires (n=3). Hence, a total of 210 subjects were analysed in this study.

3.5 Statistical Analysis

The IBM Statistical Package for the Social Sciences (SPSS) version 23.0 was used to analyse the data obtained from Google Forms data. Kolmogorov-Smirnov test was used to test the normality since the sample size was more than 50 (Mishra, Pandey, and Singh, 2019). As the *p-value* <0.05, data were not normally distributed (Table 3.2) (Mishra, Pandey, and Singh, 2019). Descriptive socio-demographic, NES, psychological distress, and sleep quality statistics were reported in median, frequencies, and percentages. The NES was classified, using NEQ's cut-off point, as the presence of NES if the global score was equal to or more than 25; no presence of NES if the global score was less than 25 (Allison, et al., 2008). The psychological distress (depression, anxiety, and stress) was classified into five categories according to DASS-21's cut-off points for each component (Table 3.1), namely normal, mild, moderate, severe, and extremely severe (Lovibond, et al., 1995). Using the PSQI's cut-off point, the sleep quality was categorised as good if the global score was not more than 5, and poor if the global score was greater than 5 (Buysee, et al., 1989). Besides, inferential statistics were used to determine the association between NES, psychological distress, and sleep quality. The association between the variables was determined using Spearman's rank correlation test since the data were not normally distributed (Dancey and Reidy, 2007). When *p-value* <0.05, the findings were significant. Table 3.3 indicates the strength of the relationship of each correlation coefficient (Dancey and Reidy, 2007).

Table 3.2: Normality test of the study.

	Kolmogorov-Smirnov Test		
	Statistic	*df*	*p-value*
Sleep Quality	0.130	210	0.000
Depression	0.166	210	0.000
Anxiety	0.135	210	0.000
Stress	0.123	210	0.000
Night Eating Syndrome	0.090	210	0.000

Table 3.3: Spearman's rank correlation coefficients interpretation.

Correlation Value (r_s)	**Interpretation**
$0.01 \leq r_s \leq 0.19$	No or negligible relationship
$0.20 \leq r_s \leq 0.29$	Weak relationship
$0.30 \leq r_s \leq 0.39$	Moderate relationship
$0.40 \leq r_s \leq 0.69$	Strong relationship
$0.70 \leq r_s$	Very strong relationship

Note. Both positive and negative relationships fit this descriptor (Dancey and Reidy, 2004).

CHAPTER 4

RESULTS

4.1 Characteristics of the Respondents

A total of 210 subjects were involved in this study, and their socio-demographic characteristics are summarized in Table 4.1. The study population's age ranged from 18 to 25 years old, with a median age of 22. Among the subjects, the majority of them were female (64.3%). In terms of faculty or institute, most of the subjects were from business and finance (34.8%), subsequently followed by science (32.4%), arts and social science (13.3%), information and communication technology (12.4%), engineering and green technology (4.3%), and Chinese studies (2.9%). In terms of year of study, nearly half of the subjects were from year 3, subsequently followed by year 1 (24.3%), year 2 (23.8%) and year 4 (3.8%).

Table 4.1: Socio-demographic of the subjects.

Characteristic	**Subjects (N=210)**	
		Median (Years)
Age		22.00
Characteristic	**Distribution**	**n (%)**
Gender	Male	75 (35.7)
	Female	135 (64.3)
Faculty	Faculty of Arts and Social Science	28 (13.3)
	Faculty of Business and Finance	73 (34.8)
	Faculty of Engineering and Green Technology	9 (4.3)
	Faculty of Information and Communication Technology	26 (12.4)
	Faculty of Science	68 (32.4)
	Institute of Chinese Studies	6 (2.9)
Year of Study	Year 1	51 (24.3)
	Year 2	50 (23.8)
	Year 3	101 (48.1)
	Year 4	8 (3.8)

Note. N = number of subjects; n = frequency; % = percentage.

4.2 Prevalence of NES

The prevalence of night eating syndrome among the UTAR undergraduates at the Kampar campus is shown in Table 4.2. The prevalence of poor sleep quality was 1.4%, with a median global score of 13. Most subjects did not have NES (98.6%); while only three were found to engage in NES (1.4%).

Table 4.2: Prevalence of NES.

Variable	Subjects (N=210)	
	n (%)	Median
Night Eating Syndrome		**13.00**
Presence of NES	3 (1.4)	26.00
Without NES	207 (98.6)	13.00

Note. N = number of subjects; n = frequency; % = percentage; NES = Night Eating Syndrome.

4.3 Prevalence of Psychological Distress

The severity level of psychological distress among the UTAR undergraduates in Kampar Campus is shown in Table 4.3. The prevalence of depression, anxiety, and stress (moderate to extremely high severity) was 30.5% with a median score of 6, 39.1% with a median score of 8 and 12.4% with a median score of 8, respectively. In terms of depression, more than half of the subjects were normal (60%), subsequently followed by moderate (22.9%), mild (9.5%), severe (4.3%) and extremely severe (3.3%). In terms of anxiety, nearly half of the subjects were normal (49.5%), subsequently followed by moderate (24.3%), mild (11.4%), severe (8.1%) and extremely severe (6.7%). In terms of stress, the majority of the subjects were normal (79%), subsequently followed by mild (8.6%), moderate (6.2%), severe (4.8%) and extremely severe (1.4%).

Table 4.3: Prevalence of psychological distress.

Variable	Subjects (N=210)	
	n (%)	Median
Depression		**6.00**
Normal	126 (60)	2.00
Mild	20 (9.5)	12.00
Moderate	48 (22.9)	14.00
Severe	9 (4.3)	24.00
Extremely severe	7 (3.3)	30.00
Anxiety		**8.00**
Normal	104 (49.5)	4.00
Mild	24 (11.4)	8.00
Moderate	51 (24.3)	12.00
Severe	17 (8.1)	16.00
Extremely severe	14 (6.7)	22.00
Stress		**8.00**
Normal	166 (79)	6.00
Mild	18 (8.6)	16.00
Moderate	13 (6.2)	22.00
Severe	10 (4.8)	26.00
Extremely severe	3 (1.4)	34.00

Note. N = number of subjects; n = frequency; % = percentage.

4.4 Sleep Quality among UTAR Undergraduates in Kampar Campus

The sleep quality among the UTAR undergraduates in Kampar Campus is shown in Table 4.4. The prevalence of poor sleep quality was 47.6%, with a median global score of 5. Nearly half of the subjects were having poor sleep quality (47.6%); followed by subjects were having good sleep quality (52.4%).

Table 4.4: Prevalence of Sleep quality.

Variable	Subjects (N=210)	
	n (%)	Median
Sleep Quality		**5.00**
Good	110 (52.4)	4.00
Poor	100 (47.6)	8.00

Note. N = number of subjects; n = frequency; % = percentage.

4.5 Association between Psychological Distress, Sleep Quality and NES

4.5.1 Psychological Distress and NES

The correlations between psychological distress and night eating syndrome are shown in Table 4.5. There was a statistically significant strong relationship between depression-NES (r_s = 0.401, p<0.001), anxiety-NES (r_s = 0.428, p<0.001), and stress-NES (r_s = 0.401, p<0.001) variables.

Table 4.5: Correlations between psychological distress and night eating syndrome.

Variable	Spearman's rank correlation coefficient (r_s)	*p-value*
Depression – NES	0.401**	<0.001
Anxiety – NES	0.428**	<0.001
Stress – NES	0.401**	<0.001

*Note. NES=Night eating syndrome. **. Correlation is significant at the 0.01 level.*

4.5.2 Sleep Quality and NES

The correlation between sleep quality and night eating syndrome is shown in Table 4.6. A statistically significant moderate relationship existed between sleep quality-NES (r_s = 0.363, p<0.001) variables.

Table 4.6: Correlation between sleep quality and NES.

Variable	Spearman's rank correlation coefficient (r_s)	*p-value*
Sleep Quality – NES	0.363**	<0.001

*Note. NES=Night eating syndrome. **. Correlation is significant at the 0.01 level.*

4.5.3 Psychological Distress and Sleep Quality

The correlations between psychological distress and sleep quality are shown in Table 4.7. There was a statistically significant strong relationship between depression-sleep quality (r_s = 0.416, p<0.001), anxiety-sleep quality (r_s = 0.443, p<0.001), and stress-sleep quality (r_s = 0.511, p<0.001) variables.

Table 4.7: Correlations between Psychological Distress and Sleep Quality.

Variable	Spearman's rank correlation coefficient (r_s)	*p-value*
Sleep Quality		
Depression – Sleep Quality	0.416**	<0.001
Anxiety – Sleep Quality	0.443**	<0.001
Stress – Sleep Quality	0.511**	<0.001

*Note. **. Correlation is significant at the 0.01 level.*

Table 4.8: Spearman's rank correlations among all variables.

Variable	NES	Depression	Anxiety	Stress	Sleep Quality
NES					
Depression	0.401**				
Anxiety	0.428**	0.754**			
Stress	0.401**	0.830**	0.797**		
Sleep Quality	0.363**	0.416**	0.443**	0.511**	

*Note. NES=Night eating syndrome. **. Correlation is significant at the 0.01 level.*

CHAPTER 5

DISCUSSION

5.1 Prevalence of NES

NES has become more common among university students due to many factors such as physiological and psychological alterations during this period. Surprisingly, the presence of NES found in this study was relatively low at 1.4%, nearly similar to the prevalence among Chinese college students at 2.4% (He, et al., 2017). However, the prevalence was 12.2% in a recent study in Malaysia (Gan, Chin and Law, 2019). This might be due to the local food environment, variety and distinctiveness of the geographical areas, ethics, cultures, and levels of urbanisation and industrialization, which impact university students' behaviours (Ali, et al., 2012; Pike and Dunne, 2015). Kampar, Perak, was considered a rural area according to Mariadass Lourdes, Michael and Eng (2012). Due to that, it might have low availability of 24-hour or late-hour restaurants, which potentially reduces the accessibility of food at late-night (Ali, et al., 2012). Thus, the students might be less likely in involving in night eating behaviour (Ali, et al., 2012). Furthermore, convenience sampling and voluntary basis methods were used in this study and might cause selection bias and underestimation of the NES population among university students.

5.2 Prevalence of Psychological Distress

Psychological distress is a common issue among university students. The prevalence of depression in this study was relatively high at 40%, consistent with the findings from Gan, Chin and Law (2019). However, the prevalence of anxiety (50.5%) and stress (12.4%) in this study was relatively higher and lower, respectively, compared to the report of (anxiety 27.8% and stress 25.9%) from Gan, Chin and Law (2019). The similar prevalence of depression and anxiety may be because these emotional reactions have similar symptoms (Arbués, et al., 2020). Meanwhile, stress was found to be lower because it is a response basically stimulated by external factors and short-term (Arbués, et al., 2020). Academic factors, such as assignments, due dates, or examinations are the most likely stressors for students. Hence, different academic conditions among university students were caused as the data collection was done from the trimester break to the first few weeks of a new trimester. In contrast, anxiety can be persistent without a stressor, which shows the possibility of higher anxiety prevalence in this study (Arbués, et al., 2020).

5.3 Prevalence of Sleep Quality

University students are one of the populations with the worst sleep habits and are significantly affected by sleep issues (Say and Lai, 2013). Unsurprisingly, poor sleep quality in this study was highly prevalent at 47.6%, similar to the findings from Kwan, Lee, and Cheng (2021). However, it showed an increase in prevalence from 2013 (33.4%) among a similar population: university students in Kampar (Say and Lai, 2013). This might be due to poor sleep quality becoming more common among university students and worsening yearly. Another possible reason affecting the prevalence might be due to the larger sampling size (n=1,118), and the sampling scale included students from the Kampar campuses of Univeristi and Kollej Tunku Abdul Rahman (Say and Lai, 2013). Late bedtime, prolonged sleep latency, frequent awakenings and insufficient total sleep time can contribute to poor sleep quality (Say and Lai, 2013; Person, 2014). This is common among university students as they tend to engage in hectic lifestyles due to heavy academic workload, lessening parental supervision, stressful social environment and etc (Seun-Fadipe and Mosaku, 2017).

5.4 Association between Psychological Distress, Sleep Quality and NES

5.4.1 Psychological Distress and NES

Depression and anxiety were significantly associated with NES (r_s = 0.401 and 0.428, p<0.001) in this study. Although Colles, et al. (2007) and Gan, Chin, and Law (2019) found no statistical significance for this association, there were more studies consistent with the findings of this study (Person, 2014; Sevincer, et al., 2016; Borges, Figueiredo and do Souto, 2017; He, et al., 2017; Gundogdu, 2022). When an individual with NES experiences unpleasant feelings, notably worsened in the evening, they would be more likely to consume food to relieve their depressive or anxiety symptoms (Person, 2014). Food can greatly affect emotions by reducing depressive feelings and stress while promoting happiness, potentially illuminating the reasons for engaging in night eating habits (Person, 2014). Gundogdu (2022) found that anxiety influenced night eating behaviour directly and indirectly as a contributing factor towards sleep issues. This suggested that anxiety can increase the likelihood of NES development by undesired feelings or increasing sleep awakenings. Apart from that, a statistically significant association was found in stress-NES (r_s = 0.401, p<0.001) variables, consistent with the previous studies (Wichianson, et al., 2009; Person, 2014; Borges, Figueiredo and do Souto, 2017; He, et al., 2017). Gan, Chin and Law (2019) also found that compared to non-stressed students, stressed students were more likely to engage in NES. Stressed students were more prone to wake up and have food ingestions to relieve their undesired feelings, as stress is a common factor that triggers NES (Nolan and Geliebter, 2012).

5.4.2 Sleep Quality and NES

A statistically significant moderate relationship existed between sleep quality-NES ($r_s = 0.363$, $p<0.001$) variables, consistent with the previous studies (Kwan, Lee, and Cheng, 2021; Gundogdu, 2022). Gan, Chin, and Law (2019) reported that NES was more likely to be developed by students with poor sleep quality than by good sleepers. This might be due to elevated ghrelin levels in poor sleepers and increased hunger, which caused them to be more likely to engage in night eating behaviours and favour NES development (Akdevelioglu, Sahin and Yesidemir, 2020). Besides, lower melatonin levels were found in NES individuals, which may cause a high tendency to frequent awakenings during the night for food, sleep disruptions and insomnia (Person, 2014; Gundogdu, 2022).

5.4.3 Psychological Distress and Sleep Quality

There was a statistically significant relationship between depression-sleep quality ($r_s = 0.416$, $p<0.001$), anxiety-sleep quality ($r_s = 0.443$, $p<0.001$), and stress-sleep quality ($r_s = 0.511$, $p<0.001$) variables, consistent with the previous studies (Seun-Fadipe and Mosaku, 2017; Rezaei, Khormali and Akbarpour, 2018; Gundogdu, 2022). Stressors from the academic burden, examinations, high expectations, future uncertainties, peers, social activities, relationships, social media, and financial burden are commonly found among university students (Ramón-Arbués, et al., 2020; Rahmatullah and Zhao, 2020; Mofatteh, 2021). These might increase the tendency to develop psychological distress and poor sleep quality (Rezaei, Khormali and Akbarpour, 2018). Poor sleep quality can be a reason or a consequence of

psychological distress (Rezaei, Khormali and Akbarpour, 2018). Person (2014) found that the relationship between sleep quality and night eating behaviour was partially mediated by stress. Stress can explain the presence of poor sleep quality among NES individuals, as stress can cause sleep disruption (Person, 2014). Besides, according to Gundogdu (2022), increased anxiety was closely linked to increased sleep issues and indirectly influenced the occurrence of NES.

5.5 Strengths of the Study

NES, psychological distress, and poor sleep quality were getting more attention among university students. This study improves understanding of the association between NES, psychological distress, and sleep quality among university students in Malaysia. Several studies have been conducted in other countries, but to the best of my knowledge, this is considered a new study on the relationships between these variables in Malaysia. This study provided an opportunity to determine the prevalence of NES in Malaysia, typically in Kampar, Perak. This study also highlighted the positive correlations between NES, psychological distress, and sleep quality. Thus, it is believed that these findings will be helpful to the establishment of therapy or prevention to help students at risk.

5.6 Limitations and Recommendations of the Study

First, due to the cross-sectional study, it is limited in determining the causal and temporal relationships. To understand the cause-and-effect relationship between the variables, cohort studies are suggested. Second, convenient sampling might cause an increased likelihood of selection bias. Students with potential NES might not be selected, causing the population to be underestimated. Additionally, since only UTAR undergraduates at the Kampar Campus were included in the sampling scale for this study, the results may not be generalizable to the whole Malaysian population representative. To ensure that the population is adequately represented and that the results can be generalised, stratified random sampling and an expanded study sample that includes students from private and public universities throughout Malaysia can be considered. To ensure that the population is adequately represented and that the results can be generalised, stratified random sampling and an expanded study sample that includes students from private and public universities throughout Malaysia can be considered. Finally, the use of self-administered questionnaires for data collection in this study could impact the reliability of the findings due to the possibility of recollection bias, misunderstanding, and honesty concerns. As it may help to reduce result biases and data errors, data collecting through interview methods or physical surveys conducted under supervision can be considered.

CHAPTER 6

CONCLUSION

In conclusion, Night Eating Syndrome (NES) was less prevalent among UTAR undergraduates on Kampar campus. However, the prevalence of psychological distress and poor sleep quality was high. Psychological distress and sleep quality were significantly associated with NES, suggesting that a high prevalence of psychological distress and poor sleep quality may contribute to future NES development among university students. This study highlights the need for early detection and management of mental health issues and sleep problems in university students to prevent the development of NES and other related disorders. Nutritionists and dietitians are also suggested to focus on behavioural strategies like food intake monitoring and cognitive therapy components when providing nutritional counselling to the students. Furthermore, future research should investigate the causes of the high prevalence of psychological distress, poor sleep quality, and potential NES risk among university students and identify effective interventions to address these issues.

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Appendix A

Ethical Approval Letter for Research Proposal by (U/SERC/209/2022)

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

Re: U/SERC/209/2022

3 November 2022

Dr Teh Lai Kuan
Head, Department of Allied Health Sciences
Faculty of Science
Universiti Tunku Abdul Rahman
Jalan Universiti, Bandar Baru Barat
31900 Kampar, Perak.

Dear Dr Teh,

Ethical Approval For Research Project/Protocol

We refer to the application for ethical approval for your students' research projects from Bachelor of Science (Hons) Dietetics programme enrolled in course UDDN3108. We are pleased to inform you that the application has been approved under Expedited Review.

The details of the research projects are as follows:

No	Research Title	Student's Name	Supervisor's Name	Approval Validity
1.	Association Between Depression and Added Sugar Intake Among Undergraduate Students	Chow Wan Yee	Dr Tan Chin Xuan	3 November 2022 – 2 November 2023
2.	Knowledge of Malaysian University Students Toward the Role of Dietary and Lifestyle Behaviors in Colorectal Cancer: A Cross-sectional Study	Lim Xin Yuan		
3.	The Relationship Between Eating Disorders, Stress, and Physical Activity Among Undergraduate Students in Malaysia	Goh Yining		
4.	Association Between Mindful Eating and Depressive Symptoms Among University Students	Sun Jia Yang		
5.	Association Between Physical Habits and Dietary Behaviors with Stress Levels Among Malaysian Young Adults	The Geik Qi		
6.	Knowledge, Attitude, and Practices Regarding the Risk of Cardiovascular Disease Among UTAR Students in Kampar, Perak	Chong Jing Yu	Mr Cheah Khang Jin	
7.	Nutritional Knowledge, Attitude and Practice Related to COVID-19 Among Young Adults in Malaysia	Tey Haw Tsyr		
8.	Association Between Weight Status and Social Media with Body Dysmorphic Disorder (BDD) Among UTAR Undergraduate Students	Chong Wan Lin	Dr Chang Sui Kiat	
9.	Associations Between Socio-demographic Factors with Body Dysmorphic Disorder (BDD) Among UTAR Kampar Undergraduate Students	Ng Jia Poh		
10.	Association Between Physical Activity and Depression with Body Dysmorphic Disorder (BDD) Among UTAR Undergraduate Students	Phua Jia Ying		
11.	The Association Between Psychological Distress, Sleep Quality, and Night Eating Syndrome (NES) Among Undergraduates in University Tunku Abdul Rahman (UTAR), Kampar Campus	Chow Hor Yan		

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Website: www.utar.edu.my

No	Research Title	Student's Name	Supervisor's Name	Approval Validity
12.	The Association Between the Physical Activity, Body Weight Status with Night Eating Syndrome (NES) Among Undergraduates in University Tunku Abdul Rahman (UTAR), Kampar	Lim An Ting	Dr Chang Sui Kiat	3 November 2022 – 2 November 2023
13.	The Association Between Sociodemographic Factors and Night Eating Syndrome (NES) Among Undergraduates in University Tunku Abdul Rahman (UTAR), Kampar Campus	Linett Chan Wei Er		
14.	Dietary Supplement Use, Knowledge and Perceptions Among Students of Faculty of Science at University Tunku Abdul Rahman (UTAR)	Chew Pei Yi	Dr Chee Huei Phing	
15.	Factors Associated with Dietary Supplement Use Among University Students at University Tunku Abdul Rahman (UTAR)	Ch'ng Jing Xuan		
16.	Knowledge, Perceptions and Usage of Dietary Supplements Use Among Students of University of Tunku Abdul Rahman (UTAR)	Hong Soo Keat		
17.	Assessment of Knowledge, Attitude and Practice of Dietary Supplement Use Among Health Science Undergraduates in Universiti Tunku Abdul Rahman (UTAR)	Low Xiang Yi		
18.	Knowledge, Attitude and Practices (KAP) of Dietary Supplements use among University Students in Kampar, Perak	Yap Zhi Qian		

The conduct of this research is subject to the following:

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

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

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

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

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

Thank you.

Yours sincerely,

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

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

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Appendix B

Online Consent Form of the Study

Personal Data Protection Notice

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

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

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

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

- a) For assessment of any application to UTAR
- b) For processing any benefits and services
- c) For communication purposes
- d) For advertorial and news
- e) For general administration and record purposes
- f) For enhancing the value of education
- g) For educational and related purposes consequential to UTAR
- h) For replying any responds to complaints and enquiries
- i) For the purpose of our corporate governance
- j) For the purposes of conducting research/ collaboration

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

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

5. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure

that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal data shall not be used for political and commercial purposes.

Consent:

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

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

8. You may access and update your personal data by writing to me through WhatsApp or email:

- +6013-4897923
- nicole.chowhoryan@1utar.my

1. **Acknowledgment of Notice** *

Mark only one oval.

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

Appendix C

Online Questionnaire of the Study

Section A: Sociodemographic information

This section consists of 5 questions. Kindly answer all questions.

1. Gender *

Mark only one oval.

- Male
- Female

2. Age *

Mark only one oval.

- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25
- Other: *Skip to end questionnaire*

3. Campus *

Mark only one oval.

- Kampar
- Sungai Long *Skip to end questionnaire*

4. Faculty *

Mark only one oval.

- ◯ Faculty of Arts and Social Science (FAS)
- ◯ Faculty of Business and Finance (FBF)
- ◯ Faculty of Engineering and Green Technology (FEGT)
- ◯ Faculty of Information and Communication Technology (FICT)
- ◯ Faculty of Science (FSc)
- ◯ Institute of Chinese Studies (ICS)
- ◯ Other: _____ *Skip to end questionnaire*

5. Year/Trimester *

Mark only one oval.

- ◯ Year 1
- ◯ Year 2
- ◯ Year 3
- ◯ Year 4

Section B.1: Night Eating Questionnaire (NEQ)

1. How hungry are you usually in the morning? *

   Mark only one oval.

   - ◯ Not at all
   - ◯ A little
   - ◯ Somewhat
   - ◯ Moderately
   - ◯ Very

2. When do you usually eat for the first time? *

   Mark only one oval.

   - ◯ Before 9:00 a.m.
   - ◯ 9:01 a.m. to 12:00 p.m.
   - ◯ 12:01 p.m. to 3:00 p.m.
   - ◯ 3:01 p.m. to 6:00 p.m.
   - ◯ 6:01 p.m. or later

3. Do you have cravings or urges to eat snacks after supper; but before bedtime? *

   Mark only one oval.

   - ◯ Not at all
   - ◯ A little
   - ◯ Somewhat
   - ◯ Very much
   - ◯ Extremely

4. How much control do you have over your eating between supper and bedtime? *

Mark only one oval.

- ◯ Not at all
- ◯ A little
- ◯ Somewhat
- ◯ Very much
- ◯ Complete

5. How much of your daily food intake do you consume after suppertime? *

Mark only one oval.

- ◯ 0%, None
- ◯ 1-25%, Up to a quarter
- ◯ 26-50%, About half
- ◯ 51-75%, More than half
- ◯ 76-100%, Almost all

6. Are you currently feeling blue or down in the dumps? *

Mark only one oval.

- ◯ Not at all
- ◯ A little
- ◯ Somewhat
- ◯ Very much
- ◯ Extremely

7. When you are feeling blue, is your mood lower in the: *

Mark only one oval.

- ◯ Early morning/ Do not change during the day
- ◯ Late morning
- ◯ Afternoon
- ◯ Early evening
- ◯ Late evening/ nightmare

8. How often do you have trouble getting to sleep? *

Mark only one oval.

- ◯ Never
- ◯ Sometimes
- ◯ About half the time
- ◯ Usually
- ◯ Always

9. Other than only using the bathroom, how often do you get up at least once in the middle of the night? *

Mark only one oval.

- ◯ Never *Skip to section C*
- ◯ Less than once a week
- ◯ About once a week
- ◯ More than once a week
- ◯ Every night

Section B.2: Night Eating Questionnaire (NEQ)

10. Do you have cravings or urges to eat snacks when you wake up at night? *

Mark only one oval.

- ◯ Not at all
- ◯ A little
- ◯ Somewhat
- ◯ Very much
- ◯ Extremely

11. Do you need to eat in order to get back to sleep when you awake at night? *

Mark only one oval.

- ◯ Not at all
- ◯ A little
- ◯ Somewhat
- ◯ Very much
- ◯ Extremely

12. When you get up in the middle of the night, how often do you snack? *

Mark only one oval.

- ◯ Never *Skip to section C*
- ◯ Sometimes
- ◯ About half the time
- ◯ Usually
- ◯ Always

Section B.3: Night Eating Questionnaire (NEQ)

13. When you snack in the middle of the night, how aware are you of your eating? *

Mark only one oval.

- () Not at all
- A little
- Somewhat
- Very much
- Complete

14. How much control do you have over your eating while you are up at night? *

Mark only one oval.

- Not at all
- A little
- Somewhat
- Very much
- Complete

15. How long have your current difficulties with night eating been going on? *

Answer in years and months.

_____

Example: 4:03:32 (4 hours, 3 minutes, 32 seconds)

16. How upsetting is your night eating to you? *

Mark only one oval.

- ◯ Not at all
- ◯ A little
- ◯ Somewhat
- ◯ Very much
- ◯ Extremely

17. How much has your night eating affected your life? *

Mark only one oval.

- ◯ Not at all
- ◯ A little
- ◯ Somewhat
- ◯ Very much
- ◯ Extremely

Section C: Depression, Anxiety and Stress Scale (DASS-21)

This section consists of 21 questions. Please read each statement and choose a number 0, 1, 2 or 3 that indicates how much the statement applied to you **over the past week**.

- 0: Did not apply to me at all (Never)
- 1: Applied to me to some degree, or some of the time (Sometimes)
- 2: Applied to me to a considerable degree or a good part of time (Often)
- 3: Applied to me very much or most of the time (Almost Always)

** There are no right or wrong answers. Do not spend too much time on any statement.*

24. Over the past week, *

Mark only one oval per row.

	0 (Never)	1 (Sometimes)	2 (Often)	3 (Almost Always)
1. I found it hard to wind down.	◯	◯	◯	◯
2. I was aware of the dryness of my mouth.	◯	◯	◯	◯
3. I couldn't seem to experience any positive feelings at all.	◯	◯	◯	◯
4. I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion).	◯	◯	◯	◯
5. I found it difficult to work up the initiative to do things.	◯	◯	◯	◯
6. I tended to overreact to situations.	◯	◯	◯	◯
7. I experienced trembling (e.g., in the hands)	◯	◯	◯	◯

8. I felt that I was using a lot of nervous energy.	⬭	⬭	⬭	⬭
9. I was worried about situations in which I might panic and make a fool of myself.	⬭	⬭	⬭	⬭
10. I felt that I had nothing to look forward to.	⬭	⬭	⬭	⬭
11.I found myself getting agitated.	⬭	⬭	⬭	⬭
12. I found it difficult to relax.	⬭	⬭	⬭	⬭
13. I felt downhearted and blue.	⬭	⬭	⬭	⬭
14. I was intolerant of anything that kept me from getting on with what I was doing.	⬭	⬭	⬭	⬭
15. I felt I was close to panic.	⬭	⬭	⬭	⬭
16. I was unable to become enthusiastic about anything.	⬭	⬭	⬭	⬭

17. I felt I wasn't worth much as a person.	⬭	⬭	⬭	⬭
18. I felt that I was rather touchy.	⬭	⬭	⬭	⬭
19. I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat).	⬭	⬭	⬭	⬭
20. I felt scared without any good reason.	⬭	⬭	⬭	⬭
21. I felt that life was meaningless.	⬭	⬭	⬭	⬭

Section D.1: Pittsburgh Sleep Quality Index (PSQI)

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

_____

Example: 8:30 AM

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

_____

Example: 4:03:32 (4 hours, 3 minutes, 32 seconds)

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

_____

Example: 8:30 AM

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 spent in bed.

_____

Example: 4:03:32 (4 hours, 3 minutes, 32 seconds)

5. During the past month, how often have you had trouble sleeping because you *

Mark only one oval per row.

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a. Cannot get to sleep within 30 minutes	◯	◯	◯	◯
b. Wake up in the middle of the night or early morning	◯	◯	◯	◯
c. Have to get up to use the bathroom	◯	◯	◯	◯
d. Cannot breathe comfortably	◯	◯	◯	◯
e. Cough or snore loudly	◯	◯	◯	◯
f. Feel too cold	◯	◯	◯	◯
g. Feel too hot	◯	◯	◯	◯
h. Have bad dreams	◯	◯	◯	◯
i. Have pain	◯	◯	◯	◯
j. Other reason(s)	◯	◯	◯	◯

According to question 5 (j), please describe the other reason(s) for causing you to have trouble sleeping during the past month. *

"-" if you do not experience trouble sleeping due to other reason(s).

6. During the past month, how often have you taken medicine to help you sleep? *

Either "prescribed" or "over the counter".

Mark only one oval.

- ◯ Not during the past month
- ◯ Less than once a week
- ◯ Once or twice a week
- ◯ Three or more times a week

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

Mark only one oval.

- ◯ Not during the past month
- ◯ Less than once a week
- ◯ Once or twice a week
- ◯ Three or more times a week

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

Mark only one oval.

- ◯ No problem at all
- ◯ Only a very slight problem
- ◯ Somewhat of a problem
- ◯ A very big problem

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

Mark only one oval.

- ◯ Very good
- ◯ Fairly good
- ◯ Fairly bad
- ◯ Very bad

10. Do you have a bed partner or roommate? *

Mark only one oval.

- ◯ No bed partner or room mate *Skip to end questionnaire*
- ◯ Partner/roommate in other room
- ◯ Partner in same room but not same bed
- ◯ Partner in same bed

Section D.2: Pittsburgh Sleep Quality Index (PSQI)

11. If you have a roommate or bed partner, ask him/her how often in the past month you have had: *

Mark only one oval per row.

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a. Loud snoring	◯	◯	◯	◯
b. Long pauses between breaths while asleep	◯	◯	◯	◯
c. Legs twitching or jerking while you sleep	◯	◯	◯	◯
d. Episodes of disorientation or confusion during sleep	◯	◯	◯	◯
e. Other restlessness while you sleep	◯	◯	◯	◯

According to question 11 (e), please describe the other restlessness you have had while you sleep during the past month. *

"-" if you do not experience other restlessness while you sleep.

_____

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ID Number(s)	19ADB04314
Programme / Course	BACHELOR OF SCIENCE (HONS) DIETETICS
Title of Final Year Project	THE ASSOCIATION BETWEEN PSYCHOLOGICAL DISTRESS, SLEEP QUALITY, AND NIGHT EATING SYNDROME (NES) AMONG UNDERGRADUATES IN UNIVERSITY TUNKU ABDUL RAHMAN (UTAR), KAMPAR CAMPUS.

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ABSTRACT Night eating disorder (NES) is a 'disorder of delayed circadian food intake', an alarming eating disorder in Malaysia, typically the university student population. It has been related to psychological distress like depression, anxiety and stress, and poor sleep quality, commonly found among university students. However, in Malaysia, there were still inadequate research studies. As a result, this study was conducted to study the association between NES, psychological distress, and sleep quality among university students. 210 undergraduates were assessed in this cross-