THE ASSOCIATION BETWEEN PERCEIVED STRESS, EATING BEHAVIOUR WITH BODY WEIGHT STATUS AMONG UNDERGRADUATE STUDENTS AT UNIVERSITI SAINS MALAYSIA, HEALTH CAMPUS

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THE ASSOCIATION BETWEEN PERCEIVED STRESS, EATING BEHAVIOUR WITH BODY WEIGHT STATUS AMONG UNDERGRADUATE STUDENTS AT UNIVERSITI SAINS MALAYSIA, HEALTH CAMPUS

by

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DECLARATION

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

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WAN NUR MAISARAH BINTI WAN MARZUKI

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LIST OF ABBREVIATIONS

PSS-10	Perceived Stress Scale – 10
AEBQ	Adult Eating Behaviour Questionnaire
BMI	Body Mass Index
H	Hunger
FR	Food Responsiveness
EOE	Emotional Over-Eating
EF	Enjoyment of Food
SR	Satiety Responsiveness
FF	Food Fussiness
EUE	Emotional Under-Eating
SE	Slowness in Eating
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization
HPA	Hypothalamic Pituitary Adrenal
JEPeM	Human Research Ethics Committee
USM	Universiti Sains Malaysia
SD	Standard Deviation
B40	Bottom 40%
M40	Middle 40%
T20	Top 20%

HUBUNGKAIT ANTARA TEKANAN YANG DIALAMI, TINGKAH LAKU PEMAKANAN DENGAN STATUS BERAT BADAN DALAM KALANGAN PELAJAR PRASISWAZAH DI UNIVERSITI SAINS MALAYSIA, KAMPUS KESIAHATAN

ABSTRAK

Orang dewasa muda biasanya dikaitkan dengan tekanan dan mempamerkan pelbagai corak tingkah laku pemakanan untuk menyesuaikan diri dengan keadaan mereka, khususnya dalam kalangan pelajar prasiswazah. Kajian ini dijalankan bagi menentukan hubungkait antara tahap tekanan yang dialami dan tingkah laku pemakanan dengan status berat badan (Indeks Jisim Badan, IJT) dalam kalangan pelajar prasiswazah di Universiti Sains Malaysia, Kampus Kesihatan. Seramai 179 orang responden telah menyertai kajian keratan rentas ini. Data telah dikumpulkan melalui soal selidik kendiri secara dalam talian yang merangkumi maklumat sosiodemografi, *Perceived Stress Scale – 10* (PSS-10) dan *Adult Eating Behaviour Questionnaire* (AEBQ), manakala pengukuran antropometri telah dijalankan secara fizikal oleh penyelidik untuk menilai IJT responden. Purata umur responden adalah 21.4 tahun. Kajian in disertai terutamanya oleh pelajar perempuan (74.3%) dan pelajar berbangsa Melayu (76.5%). Pelajar dari semua tahun pengajian telah mengambil bahagian, dan kebanyakan teridiri daripada pelajar Tahun 3 (36.3%). Hampir separuh daripada responden merupakan pelajar dari Pusat Pengajian Sains Kesihatan (47.5%). Kebanyakan pelajar berasal daripada kumpulan pendapatan sederhana ataupun M40 (41.9%) dan majoriti (80.4%) dilaporkan menerima pinjaman pelajaran sepanjang tempoh pengajian mereka. Keputusan menunjukkan bahawa sebahagian besar responden (50.3%) mempunyai berat badan normal. Nilai skor min keseluruhan bagi skala "*Food*

Approach" (3.43 ± 0.56) adalah lebih tinggi berbanding skala "*Food Avoidance"*. Dalam kalangan subskala "*Food Approach", "Enjoyment of Food"* mencatatkan skor min tertinggi (4.34 ± 0.63), manakala "*Food Fussiness"* menunjukkan skor min tertinggi (3.43 ± 0.53) bagi domain "*Food Avoidance".* Majoriti peserta (73.7%) dilaporkan mengalami tahap tekanan yang sederhana. Hasil kajian menunjukkan tiada hubungan signifikan antara tahap tekanan dengan IJT. Namun, terdapat hubungan lemah tetapi signifikan antara beberapa komponen tingkah laku pemakanan dengan IJT. "F*ood Responsiveness*" (r = 0.149, p = 0.046) dan "*Emotional Over-Eating*" (r = 0.319, p < 0.001) berhubung secara positif dengan IJT, manakala "*Satiety Responsiveness*" (r = -0.246, p < 0.001) dan "*Emotional Under-Eating*" (r = -0.184, p = 0.014) menunjukkan hubungan negatif. Kajian masa hadapan disarankan untuk meneroka faktor lain seperti status sosioekonomi dan tahap aktiviti fizikal, serta menggunakan reka bentuk kajianlongitudinal bagi mengenal pasti hubungan sebab-akibat yang lebih jelas.

ASSOCIATION BETWEEN PERCEIVED STRESS, EATING BEHAVIOUR, WITH BODY WEIGHT STATUS AMONG UNDERGRADUATE STUDENTS AT UNIVERSITI SAINS MALAYSIA, HEALTH CAMPUS

ABSTRACT

Young adults are commonly have been linked with stress and exhibit extensively variety patterns of eating behaviour to adapt to their circumstances, especially among undergraduate students. This study aimed to determine the association between perceived stress level and eating behaviour with Body Mass Index (BMI) among undergraduate students at Universiti Sains Malaysia, Health Campus. A total of 179 respondents were participated in this cross-sectional study. Data were collected through a self-administered online questionnaire, which included the Sociodemographic data, Perceived Stress Scale-10 (PSS-10) and the Adult Eating Behaviour Questionnaire (AEBQ), while anthropometric measurements were taken by the researcher physically to assess the BMI. The mean age of respondents was 21.4 years. The study sample consisted mostly of female students (74.3%) and those of Malay ethnicity (76.5%). Students from all years of study were represented, with Year 3 students making up the majority (36.3%). Nearly half of the respondents were from the School of Health Sciences (47.5%). Most participants belonged to the M40 income group (41.9%), and the majority (80.4%) reported receiving student loans during their studies. The findings indicated that more than half of the students (50.3%) had a normal body weight. The overall mean score for the Food Approach domain (3.43 ± 0.56) was higher than that of the Food Avoidance domain. Within the Food Approach subscales, "Enjoyment of Food" had the highest mean score (4.34 ± 0.63), while "Food Fussiness"

had the highest mean score (3.43 ± 0.53) among the Food Avoidance subscales. The majority of respondents (73.7%) reported experiencing moderate levels of stress. The results of the study found no significant association between stress levels and BMI. However, some eating behaviour traits showed weak but significant correlations with BMI. “Food Responsiveness” ($r = 0.149$, $p = 0.046$) and “Emotional Over-Eating” ($r = 0.319$, $p < 0.001$) were positively correlated with BMI, while “Satiety Responsiveness” ($r = -0.246$, $p < 0.001$) and “Emotional Under-Eating” ($r = -0.184$, $p = 0.014$) were negatively correlated. Future studies are recommended to explore additional factors such as socioeconomic status and physical activity level, and to adopt longitudinal designs to better establish causal relationships.

CHAPTER 1: INTRODUCTION

1.1 Background of Study

Stress is a diverse issue arises for decades, and varies depending on how one's perceives, analyses and react to it. Generally, it is described as body's natural response to demands or threats, and it can appear physically, emotionally, or behaviorally. This definition emphasizes on 'response-based' or physiological reactions (such as alertness) that happens when facing challenging conditions (Spielman et al., 2021). On other hand, stress also refers to a concept called 'stimulus-based' stress as it appears during terrifying occurrence or situations (such as demanding work and being congested in a small area), which will eventually producing particular responses towards the stimulus (Spielman et al., 2021). While stress helps people respond to problems, it can have a negative impact on their health and well-being. Persistent stressful live events may indirectly be main contributor to irregular BMI, obesity, multiple co-morbidities like cardiovascular disease, hypertension and cancer risk by inducing harmful changes in diet including unhealthy eating behaviors such as high fat intake or low fiber or fruit/vegetable intake (O'Connor et al., 2020).

Eating behaviour explains numerous aspects of eating that incorporates food choices and motivations, dietary habits, dieting, and food-related issues such as obesity and eating disorders (ED) (LaCaille, 2020). Plenty of research have shown a complex interaction between physiology, environment, psychology, culture, socio-economics and genetics that impacts eating behaviour (Emilien & Hollis, 2017). However, the actual evidence of how these factors interacts are yet to be studied since eating behaviour of an individual may be vary, and the outcome may differ based on individual's factor and situation (Emilien & Hollis, 2017). Further, this phenomenon is commonly expressed as pressure

to conform to the changing of societal standards or trends, which could have an effect on eating habits and general health.

Habitually, people are now recognized food as one of prominent way to deal with stress in daily life. Studies proposed that body weight and composition in both genders of young adults are always associated with eating behaviour such as emotional eating, cognitive restraint and uncontrolled eating (Kowalkowska & Poínhos, 2021). Emotional eating habit may result in poor and unhealthy consumption of food even it offers instant relief from stress, negative thoughts and feelings (Radzi et al., 2022). As evidence, fast food, instant or packaged food, cakes, dairy goods, and sugary foods and drinks are all strongly connected with this (Ramadhani & Mahmudiono, 2021). Based on recent findings, quick eating and meal patterns exhibited positive relationships with a greater body mass index (BMI) particularly obesity (Park & Shin, 2014). This results from earlier research might be interpreted by the overeating related to uncontrolled eating (Vainik et al., 2019), which is potentially driven by dietary limitation, resulting in a vicious cycle of gaining weight, food restriction, and failed of food restraint, which encourages the increase in excess energy intake (Banna et al., 2018).

1.2 Problem Statement and Study Rationale

For young adults in university, transitioning into a new stage of life might appear challenging, specifically when it comes to managing a variety of stresses including financial difficulties, academic demand and social pressure that could affect their emotions, thoughts, and actions. According to previous research, stress prevalence among undergraduate university students in Malaysia is approximately 62.3% (Tangiisuran et al., 2020). 91% of university students found were experienced stress in research in Mumbai (Siddiqui et al., 2021). Moreover, about 62.4% stress prevalence among college students in Egypt (Wahed & Hassan, 2016). Consequently, Malaysian university students are

among those with the highest rates of stress reported worldwide. University students are also at risk of acquiring bad eating habits as well as poor diet quality that can result in malnutrition or overnutrition, which raises the risk of developing nutrition-related diseases (Almoraie et al., 2024). In addition, adopting university life signifies those students are mostly living independently, far away from home and spending most of their time as college residents. Eating at home could provide more nutritious meals rich in sugars, dietary fats and proteins while eating out, conversely proves to be unhealthier including reduced fruits and vegetables consumption, and meals high in saturated fats that exceeded WHO recommendations (Llanaj et al., 2018).

Therefore, this study aims to determine the association between perceived stress, eating behaviour with body weight status (BMI) among undergraduate students of Universiti Sains Malaysia, Health Campus. Understanding this study helps to learn more about the connection between stress-induced eating and outcomes related to body weight status as well as to observe the eating patterns of undergraduates across ranges of body mass index (BMI). By highlighting the factors and perception that influence their eating patterns, the primary goal conducting this study is to generate recommendations and intervention that are effective and appropriate to be implement by the university students to adopt a healthier eating behaviour and achieve overall health and well-being. Furthermore, this study is not only adding to the existing literatures that were focusing on this population, but it is also vital to raise awareness among both communities and university institutions about the value of building a more supportive campus environment that prioritizes students' psychological and nutritional health.

1.3 Research Objectives

1.3.1 General Objectives

To determine the association between stress, eating behaviour with BMI among undergraduate students at Universiti Sains Malaysia Health Campus.

1.3.2 Specific Objectives

1. To determine the perceived stress level among undergraduate students of Universiti Sains Malaysia Health Campus.
2. To determine the eating behaviour status among undergraduate students of Universiti Sains Malaysia Health Campus.
3. To determine the BMI status among undergraduate students of Universiti Sains Malaysia Health Campus.
4. To determine the association between BMI and perceived stress level among undergraduate students at Universiti Sains Malaysia Health Campus.
5. To determine the association between BMI and eating behaviour among undergraduate students at Universiti Sains Malaysia Health Campus.

1.4 Research Question

1. What is the stress level among undergraduate students of Universiti Sains Malaysia Health Campus?
2. What is the eating behaviour status among undergraduate students of Universiti Sains Malaysia Health Campus?
3. What is the BMI status among undergraduate students of Universiti Sains Malaysia Health Campus?
4. Is there any association between BMI and stress level among undergraduate

students of Universiti Sains Malaysia Health Campus?

5. Is there any association between BMI and eating behaviour among undergraduate students of Universiti Sains Malaysia Health Campus?

1.5 Research Hypothesis

1.5.1 Hypothesis I

Null hypothesis (HO):

There is no significant association between BMI and stress level among undergraduate students of Universiti Sains Malaysia Health Campus.

Alternative hypothesis (HA):

There is a significant association between BMI and stress level among undergraduate students of Universiti Sains Malaysia Health Campus.

1.5.2 Hypothesis II

Null hypothesis (HO);

There is no significant association between BMI and eating behaviour among undergraduate students of Universiti Sains Malaysia Health Campus.

Alternative hypothesis (HA):

There is a significant association between BMI and eating behaviour among undergraduate students of Universiti Sains Malaysia Health Campus.

CHAPTER 2: LITERATURE REVIEW

2.1 Literature Review

2.1.1 Definition and Prevalence of Stress Level

Stress can be referred to physiological response to any type internal (physical & psychological) or external (environmental & social) stressors (Yaribeygi et al., 2017). It can activate the brain and body systems to release hormones such as adrenaline and noradrenaline, enabling the body to respond to stimuli or threatening circumstances (O'Connor et al., 2020). Moreover, humans react to stress stimuli emotionally and intellectually, which may also impact changes of behaviour (Crosswell & Lockwood, 2020). Multiple evaluation can be carried out to measure stress response including biological markers, behavioral coding and stress-scale questionnaires (Crosswell & Lockwood, 2020). In a study among healthcare university students in Can Tho City, Vietnam (n=2,515), a significant finding of Perceived Stress Scale-10 (PSS-10) showing about 35.2% of students reported with mild stress while other 62.7% and 2.1% experienced moderate and severe level stress respectively (Nguyen-Thi et al., 2023). Correspondingly to Malaysian research conducted among health sciences students in Malaysia (n=191) revealed that among 42.9% undergraduate students with the presence of stress, about 18.3% of them were in mild stress (Zaki & Rahman, 2022).

2.1.2 Effect of Stress among Undergraduate Students

As young adults grow up, entering university is one of the most crucial stages of life that might impact them diversely, notably owing to crisis of stress and pressure throughout the years of study (Stoliker et al., 2015). Despite academic pressure or financial difficulties and other variety of constraint and circumstances, nearly all undergraduates worldwide experienced stress. College students often face challenges as they engage in the adjustment to adulthood from adolescence, and increases their

susceptibility to mental health issues (Zhang et al., 2018). This includes due to the feeling of responsibility to manage financial matters such as daily costs and essential expenses (Beiter et al., 2014). Previous research demonstrated that stress experienced by students are typically associated with negative mental and physical health (Enns et al., 2018). High level of stress may seem like common issues for university students to be dealing with, however raises concerns about its impact on health outcomes among students and universities (Leppink et al., 2016).

From a situational perspective, coping is understood as a cognitive and behavioral process that evolves over time and differs according to the specific stressor an individual encounters (Bassols et al., 2015). D u r i n g this process, the person tries to solve problems by changing the environment (problem-focused coping), or the meaning of the event, in order to reduce the negative feelings associated with the problem (emotion-focused coping) (Fornés-Vives et al., 2015). Generally, diverse and particular coping mechanisms are used during stressful events, depending on the personalities of the human being and the severity of the stressor including through their eating habits (Radzi et. al., 2022). In addition, stress may induce the changes of behaviour socially such as refusing social interaction, and being physically inactive (McEwen, 2017). In the worse cases, someone might require stress-relieving medications such as anxiolytics which may eventually affect adversely to body's health (McEwen, 2017).

2.1.3 Perceived Stress Scale-10 (PSS-10)

A popular tool in psychology for measuring stress perception is the Perceived Stress Scale-10 (PSS-10) that measures how stressful people think certain events in their life have been throughout the previous month. The components of this tool are comprehensible, and the response options are straightforward, as it was designed for community samples with a minimum of a junior high school education (Cohen et al.,

1983). Hence, this enables university students to more effectively understand and interpret each question. The questions are general in nature, thus largely devoid of content specific to any sub-population group (Cohen et al., 1983). This tool was widely used to measure stress level among university students these past years. As evidence, a study including 448 undergraduates from a large suburban public university in Boca Raton, Florida, indicates a considerable gender disparity in perceived stress levels, with females reporting markedly higher total PSS scores (Graves et al., 2021). Likewise, the PSS- 10 was utilised in a local study among undergraduate nursing students at a public university in Malaysia, revealing that 76.6% of the 201 participants experienced a moderate level of stress (Shariff & Azlan, 2021).

Perceived Stress Scale is a scale that is convenient and time-saving, that comprises a variety of includes a number of simple questions concerning the present degree on stress faced by individuals (Cohen et al., 1983). Participants are given 10 questions and asked to complete each question on a 5-point Likert scale ranging from 0 (Never), 1 (Almost never), 2 (Sometimes), 3 (Often) and 4 (Very often), reflecting the frequency of specific emotions and thoughts came across over the past months (Cohen & Williamson, 1988). There will be four positive items out of ten items (items 4,5,7 and 8) are reverse-scored, with the scale adjusted from 0 (Very often), 1 (Often), 2 (Sometimes), 3 (Almost never) to 4 (Never) (Cohen & Williamson, 1988). In the current study, the measure demonstrated a strong overall validity and reliability in assessing perceived stress level among university students with Cronbach's alpha value of 0.79 (Makhubela, 2020). Scores range from 0 to 40, categorized as (0-13 = Low stress), (14-26 = Moderate stress), (27-40 = High stress) (Cohen & Williamson, 1988).

2.1.4 Definition of Eating Behaviour

Eating behaviour is a wide term that represents human's eating preferences such as

type of food, food quantity (Emilien & Hollis, 2017) and timing of meals, including snacking, nibbling, overeating and binge eating (Micanti et al., 2016). Several aspects and factors must be taken into account in how eating behaviour affects people significantly. According to the prior research, many reveals that there are complex and multiple linkages between eating behaviour and factors of biological, psychological, environmental, cultural, socio-economics and hereditary that that require continued study (Emilien & Hollis, 2017). Factors of eating behaviour vary among individuals and populations. While psychological elements may include belief, attitude, knowledge, personality traits, motivations, or cognitive processes, physiological aspects such as hunger, satiety, and a natural craving for certain kinds of food influence people's dietary choices (Fostinelli et al., 2020). Moreover, environment aspects such as observation and availability of food also crucial in determining one's eating habits (Fostinelli et al., 2020).

The transition period from adolescent to young adults make most of undergraduate students experienced adaptation process of developing a set of eating behaviour that will generally maintain for the subsequent years (Liu et al., 2024). Nevertheless, due to their busy and chaotic lifestyle, a lot of undergraduate students adopt a variety of negative habits, such inadequate diet, failure of performing physical activities and get enough of sleep (Elias et al., 2021). A study in China found that unhealthy eating among students includes high prevalence of eating food delivery and desire of consuming high fat and sugary food, were substantially linked with higher body mass index (Jiang et al., 2019). University students are young adults who should be familiar with basic source of nutritional meals. However, many of them prefer to be more flexible lifestyle, unconcerned or ignore their personal nutritional needs while knowing the importance of meeting daily dietary requirements (Abraham et al., 2018). Furthermore, if students fail to consume adequate and appropriate nourishment on a regular basis, despite a variety of

conditions, including the transition to higher education life, their educational or physical performance may suffer (Abraham et al., 2018).

2.1.5 Adult Eating Behaviour Questionnaire (AEBQ)

One of the tools used in this study includes AEBQ, which is a psychological tool that is designed to evaluate different aspects of adult's eating behaviour, especially in aiming to gauge psychological and environmental factors that can impact a person's appetite and food choices. According to Warkentin et al. (2022), AEBQ offers a practical and user-friendly tool for use in extensive scale of study population. For instance, many research have widely used AEBQ to assess eating behaviour among students, such as the study on how eating behaviour has a significant influence on students' academic achievement and overall health in Turkey (n=627) (Gümüş & Davulcu, 2024). Another study in Indonesia (n=88) also demonstrated the use of AEBQ to assess the correlation of its eating behaviour items with stress levels among health sciences students (Muhaimin et al., 2023).

The AEBQ is a validated measure of eight appetitive traits (Cronbach's $\alpha > 0.70$) and includes eight scales divided into four food approach traits which are Hunger, Food Responsiveness, Emotional Over-eating, and Enjoyment of Food, and four food avoidance traits including Satiety Responsiveness, Emotional Under-eating, Food Fussiness, and Slowness in eating (Hunot-Alexander et al., 2019). A Likert scale is used to rate each of the 35 AEBQ statements (1 = 'strongly disagree' to 5 = 'strongly agree'). Additionally, by offering personalized feedback on controlling appetitive trait responses, scores on an AEBQ may also be utilized to guide weight-control interventions, and potentially execute identification of people who are at risk of gaining weight, which could guide focused efforts to prevent obesity (Hunot et al., 2016).

2.1.6 Definition of Body Mass Index (BMI)

Body mass index (BMI) is a method used to classify the body weight status of an individual into certain categories by utilizing the anthropometric measurements of height in meters (m) and body weight in kilogram (kg) (Nuttall, 2015). By dividing body weight (kg) with squared height (m), World Health Organization (WHO) suggested that the BMI of adults in the area of Asia-Pacific are classified as underweight when below 18.5 kg/m^2, while normal weight falls in the range or 18.5 to 22.9 kg/m^2, overweight is in between of 23.0 to 24.9 kg/m^2 and categorized as obese when BMI of an individual is over 25 kg/m^2. Due to the fact that it is frequently used to describe one's fatness, abnormal BMI is also a risk factor that related to some health concerns (Nuttall, 2015) and mortality (Selvamani & Singh, 2018). For instance, being and underweight may indicates how an individual is susceptible to be malnourished, and developing severe immunological as well as eating disorders (Ogunlade, 2015). Comparably to a study by Kelishadi (2014), most underlying medical conditions such as Type 2 diabetes mellitus, cardiovascular diseases, cancers, osteoarthritis and variety of others health problems are commonly suffered by overweight and obese people.

Many studies have shown a significantly high percentage of overweight, obesity even underweight cases among university students. For example, previous study conducted in Iranian university students (n=6831), around 17.7% of overall students participated were overweight and 5.1% were found obese (Hojjati et al., 2023). Another survey among university students (n=1776) contributed to 23.1% and 4.0% prevalence of overweight and obesity respectively (Elmskini et al., 2024). A consistent finding among Malaysia's public university students revealed that approximately 16.7% were underweight, 17.5% were overweight and 9% were obese (Ahmad et al., 2023).

2.1.7 Association Between BMI and Stress

During stress situation, body systems initiate a process in which the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous systems is activated via corticotropin- releasing factor (CRF) (Harris, 2014). Stress, which is frequently classified as acute or chronic, may encourage people to act and respond alternatively such as acute stress may influence the reduction of food consumption, raise body temperature, boost alertness and physical activity, which can lead to temporary changes of body weight, behavior, and HPA axis functions (Harris, 2014). Chronic stress, on other hand, may be triggered by prolonged HPA activity by acute stress and may cause increase in body weight gain in restrained eaters (Harris, 2014).

Besides, most high-school students experienced weight changes as they entered adulthood in university life (Boyce & Kuijer, 2014). This seems to be driven by stress, which is associated with the changes in BMI (Boyce & Kuijer, 2014). It aligns with earlier studies showing that high stress levels are potentially result in body weight gain in students with high BMI and vice versa (Boyce & Kuijer, 2014). Little findings have demonstrated how chronic stress is associated with BMI directly, but it may have a substantial result on appetite cravings and eventually cause changes in BMI and weight gain (Chao et al., 2015). Principally, this concept is primarily induced by multiple factors and processes, involving physical inactivity or being sedentary, altered eating behaviours, low sleep quality, and hormonal changes (Tomiyama, 2018). Stress altered human brain's activity, hormones, and physiological systems, including hunger-related hormone as well as the development of unfavourable dietary habits like excessive eating (Tomiyama, 2018).

2.1.8 Association Between BMI and Eating Behaviour

The World Health Organization (WHO) describes the body mass index (BMI) as an indicator of to measure fatness and the diagnosis of overweight or obese individuals. For adults in Asia-Pacific region, WHO suggest that the BMI of underweight falls below 18.5 kg/m^2, normal weight is between 18.5 to 22.9 kg/m^2, overweight is 23.0 to 24.9 kg/m^2 and obese when BMI over 25 kg/m^2. In fact, both overweight and obese people are prone to increase the risk of developing co-morbidities such as type 2 diabetes mellitus and heart disease due to excessive fat deposits in the body. Some previous research demonstrates divergent prevalence of obesity between two genders. As evidence, the prevalence of overweight and obesity observed among undergraduate university students of a public universities in Sarawak, Malaysia, are high, particularly in male (Pitil & Ghazali, 2022). These findings are also consistent with a study by Gan and Yeoh (2017), since males were more likely to be overweight (14.0%) than females (12.3%), whereas a larger percentage of girls (22.4%) were underweight compared to males (14.3%). Conversely, a study by S. Khan et al. (2021) provides results of overall higher prevalence of obesity in women compared to men, which showing higher prevalence of normal weight and underweight. Overall, these findings suggest that the association between gender and body weight varies across studies, where some evidence indicates males are more likely to be overweight, whereas other studies demonstrate a higher prevalence of obesity among females.

Studies suggested that there is correlation between eating behavior and body weight outcomes that my affect the weight management (Bouhlal et al., 2016). As they begin their own lives, young adults are especially susceptible to poor eating habits that can result in eating disorders and/or weight gain (Kowalkowska & Poínhos, 2021). Based on Hunot et al. (2016) research using Adult Eating Behaviour Questionnaire, it was found

that people with higher BMIs were prone to score higher on "food approach" behaviors (Food Responsiveness, Emotional Over-eating and Enjoyment of Food). In contrast, these people scored lower on "food avoidance" behaviors (Satiety Responsiveness, Emotional Under-eating and Slowness in Eating) but showing no connection between BMI and Hunger or Food Fussiness traits. This highlights how persons with greater BMI are more fascinated with food, whilst those with lower BMI may be more susceptible to engage in food avoidance behaviours.

2.2 Conceptual Framework

As shown in Figure 1 above, this study framework posits a direct association between variables that will impact the quality of individual's nutritional intake. Both stress level and eating behaviour are represented as independent variables in current study. Stress, which has been identified as an independent variable alters depending on various factors including psychological, biological, academic, lifestyle, social environment and financial. Earlier studies suggested university students are commonly facing complicated stressors in their life, which pressure of academic grades demands, adapting to balance coursework with other responsibilities, preparation to pursue career after graduation and developing social relationships (Bulo & Sanchez, 2014). Hence, occurrence of stress among university students and its effects on BMI need to be studied, as more current findings reported that psychosocial stress has been discovered and linked to poor weight managements (Kupeli, 2014).

On other hand, BMI serves as a dependent variable in this study, reflects the outcomes of weight changes influenced by independent variable of eating behaviour among university students (Geiker et al., 2017). Negative eating behavior includes meal time restrictions, unfavourable snacking, energy-densed food consumption, stress-eating, and processed food intake are several factors that may contributes to the negative changes

in weight status among young adults (Sogari et al., 2018). Some research suggested that psychological distress constitutes one of the factors that may result in the insufficient sleep, induced physical inactivity, rise in food cravings which leading to the increasing of body weight and obesity, and reducing the effectiveness of weight-loss strategies (Geiker et al., 2017). In contrast, individuals with greater emotional eating behaviour scores will exerts an association with a lower BMI in both genders (Manoharan & Vanoh, 2024).

However, the potential moderating factors that will not be focused in this study such as sociodemographic data like age, gender and socioeconomic status also can be accounted to enhance the intensity of these interaction. For example, different years of study among undergraduates may deal with different stressors, necessitating more diverse coping techniques (Mofatteh, 2020). While emotional eating is more common in women than men (Smith et al., 2020), low restricted eating could contribute to raised body mass index (BMI) in people with a lower socioeconomic background, with more prevalence in controlled eating among higher socioeconomic background people (Löffler et al., 2017)

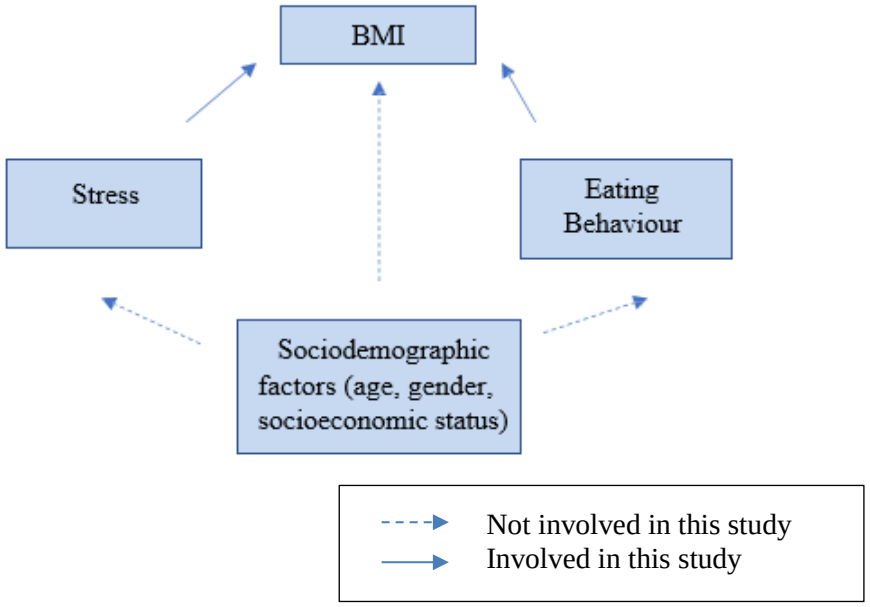

Figure 1 Conceptual Framework of Study

CHAPTER 3: METHODOLOGY

3.1 Research Design

This research involved a cross-sectional study design, with respondents providing data and information via completely English questionnaires. The questionnaire given are related to sociodemographic status such as gender, age, ethnicity, years of study, school of study, monthly household income and any additional financial support during study. In addition, the questionnaire also Perceived Stress Scale-10, Adult Eating Behaviour Questionnaire, and anthropometric measurements of undergraduate students of Universiti Sains Malaysia Health Campus. Cross-sectional study is the most suitable study design to be used in this quantitative research to determine the association between perceived stress, eating behaviour, with BMI among undergraduate students of Universiti Sains Malaysia, Health Campus. While it requires data collection and analysis at certain point of time, this study design is relatively affordable, easier and less time consuming for the researcher to complete.

3.2 Study Area

This study will be conducted in Universiti Sains Malaysia, Health Campus including all three schools which are School of Health Sciences, School of Medical Sciences and School of Dental Sciences. The reason of choosing this study area because it is more convenient to conduct data collection for both online questionnaires and physical anthropometric measurements of the respondents within given research time.

3.3 Study Population

This study involves the subjects of undergraduate students of Universiti Sains Malaysia Health Campus, encompassing students of first to fifth years of study. The target sample was selected since they are more conveniently available to engage in this study as

compared to postgraduate students or other populations.

3.4 Selection Criteria

3.4.1 Inclusion Criteria

The inclusion criteria of the subject include:

- Participants aged between 19 to 25 years old
- Participants must currently enroll as undergraduate students of either School of Health Science, School of Medical Science or School of Dental Science in Universiti Sains Malaysia, Health Campus
- Participants must have Malaysian nationality

3.4.2 Exclusion Criteria

Subjects are excluded if they are:

- Currently diagnosed underlying chronic diseases such as diabetes mellitus, cardiovascular vascular diseases and cancer, or any mental health or psychological issues such as anxiety, depression, eating disorders, bipolar disorders and schizophrenia.

3.5 Sample Size Estimation

The formula that is used to calculate sample size in this study is

$$n = [\frac{Z}{\Delta}]^2 p(1-p)$$

n = sample size

Z = value represents the desired confidence level (95%)

Δ = precision

p = anticipated proportion of population

3.5.1 Sample Size Estimation for Stress Level

For this sample size calculation, Z-score value for 95% confidence interval set is 1.96 and the precision is set to be 5%. Based on previous study, the prevalence of high stress undergraduate university students is 12%. Hence, the anticipated proportion of population used for this calculation is 0.12 (Hamzah et al., 2019). The number of subjects calculated for this sample size will be 179 participants.

$n = [\frac{1.96}{0.05}]^2(0.12)(1 - 0.12)$

n = 162.27 + 10% dropout

n = 178.49 ~ 179 samples

3.5.2 Sample Size Estimation for Eating Behaviour

For this sample size calculation, Z-score value for 95% confidence interval set is 1.96 and the precision is set to be 5%. Based on previous study, the prevalence of indicative of distorted eating attitudes and behaviour among undergraduate university students is 2.47%. Hence, the anticipated proportion of population used for this calculation is 0.02 (Liao et al., 2012). The number of subjects calculated for this sample size will be 33 participants.

$n = [\frac{1.96}{0.05}]^2(0.02)(1 - 0.02)$

$n = 30.12 + 10\%$ dropout

$n = 33.13 \sim 33$ samples

3.5.3 Sample Size Estimation for BMI

For this sample size calculation, Z-score value for 95% confidence interval set is 1.96 and the precision is set to be 5%. Based on previous study, the prevalence of obese among undergraduate university students is 11.2 %. Hence, the anticipated proportion of population used for this calculation is 0.11 (Sugathan & Bagh, 2014). Number of subjects calculated for this sample size will be 124 participants.

$n = [\frac{1.96}{0.05}]^2(0.11)(1 - 0.11)$

n = 150.44 + 10% dropout

n = 165.5 ~ 166 samples

3.5.4 Sample Size Estimation for Association Between Stress and BMI

$$n = \frac{p1(1-p1)+p2(1-p2)}{(p1-p1)^2} + (z\alpha + z\beta)^2$$

n = sample size

p = anticipated proportion of population

α = level of statistical significance

zα = 1.96 (α=0.05)

zβ = 0.84 (80% power)

For this sample size calculation, Z-score value for 95% confidence interval set is 1.96, 5% of precision, and the power of this study has been set at 80%. Based on previous study the prevalence of stress undergraduate university students is 12%. So, the anticipated proportion of population (p1) used for this calculation is 0.12 (Hamzah et al., 2019. Other studies showed that the prevalence overweight university students are 47.3% (Sanlier et al., 2014). So, the anticipated proportion of population (p2) used for this

calculation is 0.47. The number of subjects calculated for this sample size will be 24 participants.

$$n = \frac{0.12(1-0.12)+0.47(1-0.47)}{(0.12-0.47)^2} + (1.96 + 0.84)^2$$

$$n = 10.74 + 10\% \, dropout$$

$$n = 11.81 \times 2$$

$$n = 23.6 \sim 24 \, samples$$

3.5.5 Sample Size Estimation for Association Between Eating Behaviour and BMI

$$n = \frac{p1(1-p1)+p2(1-p2)}{(p1-p1)^2} + (z\alpha + z\beta)^2$$

n = sample size

p = anticipated proportion of population

α = level of statistical significance

zα = 1.96 (α=0.05)

zβ = 0.84 (80% power)

For this sample size calculation, Z-score value for 95% confidence interval set is 1.96, 5% of precision, and the power of this study has been set at 80%. Based on previous study, prevalence of unhealthy eating behaviour among university students is 82.3% (Ramón-Arbués et al., 2019). So, the anticipated proportion of population (p1) used for this calculation is 0.82. Other studies showed that the prevalence overweight university students are 47.3% (Sanlier et al., 2014). So, the anticipated proportion of population (p2) used for this calculation is 0.47. The number of subjects calculated for this sample size will be 24 participants.

$$n = \frac{0.82(1-0.82)+0.47(1-0.47)}{(0.82-0.47)^2} + (1.96 + 0.84)^2$$

$$\text{n} = 11.08 + 10\%\ dropout$$

$$\text{n} = 12.19 \times 2$$

$$\text{n} = 24.4 \sim 24\ samples$$

Based on all calculation, the range of sample size falls between 24 to 179 participants. Thus, a total of 179 subjects will be required in this study.

3.6 Sampling Method and Subject Recruitment

Subjects are recruited by using a non-probability approach which is convenient sampling method. This type of sampling technique was used since all Universiti Sains Malaysia, Health Campus undergraduate students who satisfy the inclusion requirements, do not fulfil the exclusion criteria, and are eager to participate, are technically qualified to take part in the study. After studying the research information and completing the consent form, they will complete the provided online questionnaire.

3.7 Research Tools and Materials

There are a set self-administered of questionnaire consists of four sections; Section A: Sociodemographic data, Section B: Perceived Stress Scale – 10 and Section C: Adult Eating Behaviour Questionnaire. Respondents may leave the last section (Section D) blank, as this part will only be filled in by the researcher after conducting anthropometric measures among the participants. All participants will be required to provide answers appropriately to the different kinds of questions that are included in each section.

3.7.1 Section A: Sociodemographic Data

Personal information regarding the subject, such as age, gender, ethnicity, year of study, school presently attended, monthly household income, and any loans or scholarships earned during the educational years, should be gathered in this section.

3.7.2 Section B: Perceived Stress Scale – 10 (PSS-10))

A set of English version Perceived Stress Scale – 10 (PSS-10) (Cohen et al., 1983), was obtained with the permission of the original author (Appendix C). A 5-point Likert scale ranging from 0 (Never), 1 (Almost never), 2 (Sometimes), 3 (Often) and 4 (Very often) will determine the scoring method. There will be four positive items out of ten items (items 4,5,7 and 8) that are reverse scored, with the scale adjusted from 0 (Very often), 1 (Often), 2 (Sometimes), 3 (Almost never) to 4 (Never). Total scores of all 10 items will be in the range of 0 to 40, with greater scores indicates greater perceived stress; (0-13 = Low stress), (14-26 = Moderate stress), (27-40 = High stress) (Cohen & Williamson, 1988).

3.7.3 Section C: Adult Eating Behaviour Questionnaire (AEBQ)

This set of Adult Eating Behaviour Questionnaire (AEBQ) (Hunot et al., 2016), was obtained with the permission of the original author (Appendix D). It consists of 5-point Likert scale that is used to rate respondents' agreement level for each of the 35 AEBQ statements. The scale includes (1 = strongly disagree), (2 = disagree), (3 = neither disagree or agree), (4 = agree) and (5 = strongly agree). AEBQ are divided into Food Approach and Food Avoidance scales, which include 4 appetitive traits each.

Food Approach scales consist of Hunger (H), Food Responsiveness (FR), Emotional Over-Eating (EOE) and Enjoyment of Food (EF). Hunger includes 5 items ("I

often feel hungry"), Food Responsiveness includes 4 items ("I am always thinking about food"), Enjoyment of Food includes 3 items ("I enjoy eating") and Emotional Over-Eating includes 5 items ("I eat more when I'm angry"). On other hand, Food Avoidance scales consist of Satiety Responsiveness (SR), Emotional Under-Eating (EUE), Food Fussiness (FF) and Slowness in Eating (SE). Satiety Responsiveness includes 4 items ("I get full up easily"), Emotional Under- Eating includes 5 items ("I eat less when I'm worried"), Food Fussiness includes 5 items ("I refuse new foods at first") and Slowness in Eating includes 4 items ("I eat more and more slowly during the course of a meal"). In addition, item number 19 ("I am interested in tasting new food I haven't tasted before), 12 ("I enjoy tasting new food"), 24 ("I enjoy a wide variety of foods"), 14 ("I often finish my meals quickly") should be reverse scored (1 = 'strongly agree' to 5 = 'strongly disagree'). The mean score for each subscale of the AEBQ is calculated by averaging the responses of all items within that subscale. A higher mean score reflects a stronger tendency toward the specific eating behavior represented by that subscale.

3.7.4 Section D: Anthropometric Data

This part is administered by the researcher, in which subjects will attend to the data collection on chosen date, to measure weight (in kg) and height (in metre) by the researcher at certain locations (*Pusat Mahasiswa* or *Desasiswa Murni*). Participants' current body weight and height will be measured twice by the researcher using Omron Karada HBF 214 weighing scale and Seca 213 portable stadiometer to obtain the average reading. The collected anthropometric data will be recorded by the researcher for body mass index (BMI) calculation using the formula of $BMI = \frac{weight\ (kg)}{height\ (m^2)}$According to the World Health Organization's (WHO) BMI guidelines for the Asia-Pacific region, the calculated BMI will be classified into underweight (18.5 kg/), normal weight (18.5 to 22.9 kg/m^2), overweight (23.0 to 24.9 kg/m^2) and obese (≥25 kg/m^2).