UNIVERSITI PUTRA MALAYSIA

FACTORS ASSOCIATED WITH MINDFUL EATING AMONG UNDERGRADUATE STUDENTS IN UNIVERSITI PUTRA MALAYSIA

WAN NURATIKA BINTI WAN ZAINULABIDIN

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A project submitted as a partial fulfillment of the requirement for the degree of Bachelor of Science (Nutrition and Community Health) from the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia

This project entitled “Factors associated with mindful eating among undergraduate students in Universiti Putra Malaysia” was prepared by Wan Nuratika binti Wan Zainulabidin and submitted to the Faculty of Medicine and Health Sciences as a partial fulfilment of the requirement for the degree of Bachelor of Science (Nutrition and Community Health) from the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.

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Date:

ACKNOWLEDGEMENTS

First and foremost, all praises and thanks to the God for showering His blessings throughout my final year project that allow me to complete it successfully. I would like to express my sincere gratitude to my beloved supervisor, Assoc. Prof. Dr. Gan Wan Ying for her enthusiasm, good supervision, guidance and continuous support throughout my final year project. I deeply grateful for her patience, insightful feedbacks and unceasing ideas that have assisted me in completing my research and writing of this thesis.

Next, I would like to express my sincere appreciation to my groupmates, Siti Fatimah Razali, Nurul Amirah Aziz and Wong Jenn Nan for their cooperation, help and encouragement throughout this project. Not to forget, I deeply indebted with my course mates that helped me during data collection for this project.

Finally, my deepest gratitude to my beloved parents for their endless support and sincere prayer. I have gained lots of new experience and knowledge throughout this research project. I hope findings of this project will be beneficial for all specially to help health professionals to develop appropriate intervention and health promotion programs in improving nutritional status and healthy eating behaviours among undergraduate students.

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ABSTRACT

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Wan Nuratika binti Wan Zainulabidin

Mindful eating is about being conscious of our eating habits and involves paying full attention to the experience of eating and drinking. It emphasizes on how to eat than what to eat or what not to eat. Examples of mindful eating include sitting at a dining table when eating, chewing more slowly, eating away from distractions such as the TV, computer or smartphone, and no multitasking during mealtimes. University students are prone to mindless eating such as eating quickly and eating while doing assignments. If students who soon are entering adulthood persist these poor eating habits, they might suffer negative health effects such as obesity, diabetes, high blood pressure and heart disease. There are little published data exploring mindful eating in the university setting. Therefore, this cross-sectional study aims to determine the factors associated with mindful eating among undergraduate students in Universiti Putra Malaysia. This study included 276 respondents (25.7% males and 74.3% females) with a mean age of 20.61 ± 1.28 years old from three randomly selected faculties. Respondents completed an online survey comprising questionnaires about socio-demographic characteristics, mindful eating, physical activity, eating behaviours, depression, anxiety, stress, body appreciation and self-compassion. Body weight, height, waist circumference and body fat percentage were measured by researcher. Results showed that mean score of mindful eating was 2.68 ± 0.23, ranging from 1.90 to 3.21. One in ten of the respondents (12.0%) were underweight, 19.1% were overweight and 11.6% were obese. One in five of the respondents (19.6%) had abdominal obesity and 39.7% had unhealthy body fat percentage. Uncontrolled eating (r=-0.318, p<0.001), emotional eating (r=-0.295, p<0.001), depression (r=-0.153, p=0.011), stress (r=-0.126, p=0.036), body appreciation (r=0.147, p=0.015) and self-compassion (r=0.195, p=0.001) were significantly correlated with mindful eating among undergraduate students. However, no significant difference in mindful eating score with socio-demographic status and no significant relationships were found between body mass index, waist circumference, body fat percentage, physical activity, cognitive restraint and anxiety with mindful eating in this study. In conclusion, health promotion programs should highlight the importance of preventing uncontrolled eating, emotional eating, depression, stress and enhancing body appreciation and self-compassion among undergraduate students in order to promote mindful eating as one of the healthy eating practices.

ABSTRAK

FAKTOR YANG BERKAITAN DENGAN PEMAKANAN SECARA SEDAR (*MINDFUL EATING*) DALAM KALANGAN PELAJAR PRASISWAZAH DI UNIVERSITI PUTRA MALAYSIA

Wan Nuratika binti Wan Zainulabidin

Pemakanan secara sedar *(mindful eating)* adalah tentang menyedari tabiat pemakanan dan melibatkan perhatian penuh terhadap pengambilan makanan dan minuman. Ia lebih menekankan kepada bagaimana makan daripada apa yang hendak dimakan atau apa yang tidak boleh dimakan. Contoh pemakanan secara sedar termasuk duduk di meja makan semasa makan, mengunyah dengan lebih perlahan, jauhi gangguan seperti TV, komputer atau telefon pintar sewaktu makan, dan tidak melakukan pelbagai tugas semasa waktu makan. Pelajar universiti terdedah kepada pemakanan secara tidak sedar (*mindless eating*) seperti makan dengan cepat dan makan semasa membuat tugasan. Jika pelajar yang akan memasuki usia dewasa masih mengekalkan tabiat pemakanan yang kurang sihat ini, mereka mungkin mengalami kesan negatif terhadap kesihatan seperti obesiti, diabetes, tekanan darah tinggi dan penyakit jantung. Kajian mengenai pemakanan secara sedar dalam kalangan pelajar prasiswazah amat terhad. Justeru itu, kajian keratan rentas ini bertujuan untuk mengenalpasti faktor yang berkaitan dengan pemakanan secara sedar dalam kalangan pelajar prasiswazah di Universiti Putra Malaysia. Kajian ini telah disertai oleh seramai 276 orang pelajar (25.7% lelaki dan 74.3% perempuan) dengan purata umur 20.61 ± 1.28 tahun daripada tiga fakulti yang dipilih secara rawak. Responden melengkapkan satu set borang soal selidik dalam maya yang merangkumi maklumat sosiodemografik, pemakanan secara sedar, aktiviti fizikal, tingkah laku pemakanan, kemurungan, kebimbangan, tekanan, penghargaan badan dan belas kasihan diri. Berat badan, ketinggian, lilitan pinggang dan peratusan lemak badan diukur. Hasil kajian menunjukkan purata skor pemakanan secara sedar adalah 2.68 ± 0.23, dengan julat 1.90 - 3.21. Satu daripada sepuluh responden (12.0%) mengalami kurang berat badan, 19.1% berat badan berlebihan dan 11.6% obes. Satu daripada lima responden (19.6%) menunjukkan obesiti abdominal dan 39.7% menunjukkan peratusan lemak badan yang tidak sihat. Pemakanan tidak terkawal (r=-0.318, p<0.001), pemakanan emosi (r=-0.295, p<0.001), kemurungan (r=-0.153, p=0.011), tekanan (r=-0.126, p=0.036), penghargaan badan (r=0.147, p=0.015) dan belas kasihan diri (r=0.195, p=0.001) menunjukkan hubung kait yang signifikan dengan pemakan secara sedar dalam kalangan pelajar prasiswazah. Walau bagaimanapun, tiada perbezaan yang signifikan dalam skor pemakanan secara sedar dengan status sosio-demografi dan tidak terdapat hubung kait yang signifikan antara indeks jisim tubuh, lilitan pinggang, peratusan lemak badan, aktiviti fizikal, pengekangan kognitif dan kebimbangan dengan pemakanan secara sedar dalam kajian ini. Kesimpulannya, program promosi kesihatan perlu menekankan kepentingan untuk mencegah pemakanan yang tidak terkawal, pemakanan emosi, kemurungan, tekanan dan meningkatkan penghargaan badan dan belas kasihan diri dalam kalangan pelajar universiti untuk menggalakkan pemakanan secara sedar sebagai salah satu amalan pemakanan yang sihat.

CHAPTER 1

INTRODUCTION

1.1 Background

With the alarming rise of overweight and obesity in Malaysia over the last few decades, it is crucial to explore new approaches and strategies to improve diet quality and weight status. According to Grinnell, Greene, Melanson, Blissmer and Lofgren (2011), typical intervention to encounter poor diet quality including promotion of fruit and vegetable intake, increase dairy intake, and combining diet and physical activity education are moderately successful for short-term but most success diminished at follow-up assessment. Traditional approaches to lose or maintain weight usually involve eating less food and be physically active. Unfortunately, this traditional approach is often ineffective for long-term weight maintenance (Kennedy, Serrano, Hosig, Duffet, & Ju, 2016).

"Mindfulness" was first defined by Kabat-Zinn (1991) as "*paying attention in a particular way, on purpose, in the present moment, and nonjudgmentally*". Mindfulness may be a component of maintaining weight through enhancing internal feelings of self-awareness and emotions that affect eating (Grinnell et al., 2011). Therefore, in this new era of technology, innovative approaches using mindfulness are needed to improve weight status. Mindfulness approach is novel to weight maintenance but received little attention (Grinnell et al., 2011). Mindfulness in

nutrition context is known as mindful eating (Framson, Kristal, Schenk, Littman, Zeliadt, & Benitez, 2009).

"Mindful eating is conceptualized as being aware in the present moment when one is eating, paying close attention to the senses, including physical and emotional sensations" (Moor, Scott, & McIntosh, 2012). According to The Center for Mindful Eating (2013), an individual who eats mindfully becomes aware of the interconnection of earth, living beings, and cultural practices as well as the impact of their food choices. In other words, mindful eating is about choosing foods consciously and engendering awareness of helpful cues related to food intake (Durukan & Gül, 2019). It can also be defined as making nutritious and enjoyable food choices, making eating as the only activity, eating in slow rate, using of all senses when eating or increasing awareness of unmindful eating and its consequences (Lofgren, 2015).

Generally, mindful eating is a wellness focus and listening to hunger, fullness, and taste satiety cues, in which it emphasizes on how to eat than what to eat or what not to eat (Mathieu, 2009). The benefits of mindful eating include regaining sense of hunger and satiety, increased self-esteem, helping in losing and maintaining weight, and a sense of empowerment with regard to eating (Mathieu, 2009). Furthermore, mindful eating is considered a skill that augments the usual weight loss methods, such as counting calories, dieting, and limiting portion sizes (Fred Hutchinson Cancer Research Center, 2009). Therefore, mindful eating can play an important role in weight maintenance (Durukan & Gül, 2019), in which it helps individuals savour the moment and the food and encourage their full presence for the eating experience (Nelson, 2017).

Health status of university students has become a concern in public health (Tosevski, Milovancevic, & Gajic, 2010). University students who have experienced

a shift from school to university life often practice unhealthy dietary habits such as eating fast food, eating quickly and eating while doing assignments. These are the examples of mindless eating which may eventually lead to weight gain and obesity (Kaipainen, Payne, & Wansink, 2012). If students who soon are entering adulthood persist poor eating habits, they might suffer negative health effects such as obesity, diabetes, hypertension and heart disease (Bahl, Milne, Ross, & Chan, 2013). Eating behaviours of university students are influenced by the same factors as for others; however, academic stress in addition living independently for the first time might be a challenge in maintaining or developing healthy eating behaviours (Mantzios, Egan, Bahia, Hussain, & Keyte, 2018a).

Mindful eating can lead to positive health outcomes. University students with higher mindfulness score were more likely to have greater knowledge of self, more self-regulating behaviour, have a better ability to improve mood disturbances as well as a higher level of positive well-being (Brown & Ryan, 2003). A study among university women found that mindful eating by eating slowly helped one feels satiated sooner and reduced overall calorie intake during a meal (Andrade, Greene, & Melanson, 2008). In addition, Framson et al. (2009) mentioned that the strategies of mindful eating could help university students to identify internal cues of hunger and satiety and respond to those cues instead of environmental or psychosocial cues.

A better understanding on mindful eating might lead to more effective intervention strategies for addressing overweight and obesity risk in university populations (Moor et al., 2012). To date, there are little published studies on healthy eating behaviour practices through mindfulness approach in the context of Malaysia. Thus, by studying mindful eating behaviour among university students, it can help the

researchers to identify possible factors that are associated with mindful eating, in which future interventions could be planned.

1.2 Problem Statement

Research in mindful eating is still in its infancy (Mantzios & Wilson, 2015). Most of the studies regarding mindful eating among university students were conducted in Western countries (Davis, Anderson, & Pobocik, 2014; Grinnell et al., 2011; Moor et al., 2012; Pierson et al., 2016; Taylor, Daiss & Krietsch, 2015). Research to date exploring mindful eating in Malaysia is inadequate and there is lack of study in evaluating mindful eating concept in a university setting. There is only one recently published study relating mindful eating and body weight status among university students in Malaysia (Salwani, Suriati, Aliza, Wan Azdie, & Tubanur, 2019). Possible factors related to mindful eating were not explored in that study. Therefore, more studies are needed to be conducted among Malaysian university students.

In term of sociodemographic factors, inconsistent findings were shown in comparing mindful eating with age groups and gender. For instance, Framson et al. (2009) reported significant difference in mindful eating between younger and older age. However, Berdal (2012) found no significant difference in mindful eating between age groups. Besides, Berdal (2012) showed that females had significantly higher scores of mindful eating compared to males. However, Köse and Çıplak (2020) found no difference in mindful eating scores between males and females. A local study on development of mindfulness module in promoting healthy lifestyle among university students was mainly focused on women but no male was included (Siti Norazilah, Nisha Nurshazwani, Shaira Parveen, Madihie, & Salmah, 2017). Therefore,

by including male respondents in the present study, difference in mindful eating by sex can be determined in Malaysia context.

Previous studies demonstrated inconsistent findings concerning the relationship between body mass index (BMI) and mindful eating. Several studies found that there were significant negative relationship between BMI and mindful eating (Mantzios et al., 2018a, 2018b; Pintado-Cucarella & Rodríguez-Salgado, 2016; Salwani et al., 2019; Webb, Rogers, Etzel, & Padro, 2018). However, some other studies showed no relationship (Anderson, Reilly, Schaumberg, Dmochowski, & Anderson, 2015; Grinnell et al., 2011; Taylor et al., 2015). Besides, there is limited study on the relationship of waist circumference and body fat percentage with mindful eating. Hence, further investigation is required in order to provide a better understanding regarding the relationship between body composition and mindful eating.

University students in Malaysia were found to be physically inactive (Goje, Salmiah, Ahmad Azuhairi, & Jusoff, 2014; Zulkhairul Naim, Khairul Anwar, Abdul Rahman, & Nur Zuliani, 2016), practiced unhealthy eating behaviours (Gan, Mohd Nasir, Zalilah, & Hazizi, 2011a; Norudin, Mohamad, Zalinawati, & Kartini, 2016) and experienced depression, anxiety and stress (Amalia & Mohd Saizam, 2015; Gan et al., 2011b; Talwar, Tan, Kartini, & Nur Fatihah, 2016) as well as having negative body image perception (Akira et al., 2018). These unhealthy behaviours were found to be related to mindful eating (Mantzios et al., 2018b; Moor et al., 2012; Webb et al., 2018; Winkens, van Strien, Brouwer, Penninx, Visser, & Lähteenmäki, 2018). However, inconsistent findings (Framson et al., 2009; Grinnell et al., 2011; Moor et al., 2012) were reported. Their associations with mindful eating were also unclear in the local context. Therefore, the purpose of this study was to determine factors associated with

mindful eating among undergraduate students in Universiti Putra Malaysia. The research questions need to be answered in this study are:

i. Are there any difference in mindful eating score with socio-demographic status among undergraduate students in Universiti Putra Malaysia?

ii. Are body composition, behavioural and psychological factors associated with mindful eating among undergraduate students in Universiti Putra Malaysia?

1.3 Significance of the Study

Previous evidence has shown that undergraduate students tend to develop mindless eating. There is no published study in Malaysia on mindful eating and its associated factors among undergraduate students. Hence, this study can help to provide information about mindful eating among undergraduate students in Malaysia. Besides, by understanding the possible factors associated with mindful eating, it can help health professionals such as nutritionists to develop appropriate nutrition education programs to promote healthy eating behaviours among undergraduate students. This study can also provide baseline data and can be used as a reference for future research on mindful eating, particularly among undergraduate students in Malaysia.

1.4 Research Objectives

1.4.1 General Objective

To determine factors associated with mindful eating among undergraduate students in Universiti Putra Malaysia.

1.4.2 Specific Objective

i. To examine personal factors (age, sex, ethnicity, courses of study, year of study, monthly allowance and body composition), behavioural factors (physical activity and eating behaviours) and psychological factors (anxiety, depression, anxiety, stress, body appreciation, and self-compassion) of undergraduate students.

ii. To assess mindful eating in undergraduate students.

iii. To compare mindful eating by different socio-demographic status (age, sex, ethnicity, course of study, year of study and monthly allowance) among undergraduate students.

iv. To determine the relationships of body composition, behavioural factors and psychological factors with mindful eating among undergraduate students.

1.5 Research Hypotheses

i. There are significant differences in mindful eating by different socio-demographic status (age, sex, ethnicity, course of study, year of study and monthly allowance) among undergraduate students in Universiti Putra Malaysia.

ii. There are significant relationships of body composition with mindful eating among undergraduate students in Universiti Putra Malaysia.

iii. There are significant relationships of behavioural factors with mindful eating among undergraduate students in Universiti Putra Malaysia.

iv. There are significant relationships of psychological factors with mindful eating among undergraduate students in Universiti Putra Malaysia.

1.6 Research Framework

As shown in Figure 1.1, the dependent variable of this study was mindful eating among undergraduate students, whereas the independent variables were personal factors, behavioural factors and psychological factors.

Mindful eating strategies could help university students to identify internal cues of hunger and satiety and respond to those cues instead of environmental or psychosocial cues (Grinnell et al., 2011). Appropriate cues for eating such as low emotional responses to eating is considered as mindful eating. Women may be more likely than men to respond to emotional distress by eating (Framson et al., 2009). Therefore, women are less likely in practicing mindful eating than men. Besides, mindful eating was found to be significantly difference between younger age group and older age group, where older age group was more mindful than younger age group (Framson et al., 2009). Davis et al. (2014) found that higher mindful eating practice could be seen in those students who were in health major or health minor and nutrition program. On the other hand, several studies found that there was a significant negative association between BMI and mindful eating (Pintado-Cucarella & Rodríguez-Salgado, 2016; Webb et al., 2018). Grinnell et al. (2011) also found that those with less mindful eating had higher waist circumferences than more mindful eating individuals.

In term of behavioural factors, students who were more physically active were less likely to be aware of their food and to eat in response to negative emotions (Moor et al., 2012). Studies found that an individual who increased mindfulness had lower susceptibility to emotional eating (Grinnell et al., 2011), cognitive restraint (Framson et al., 2009) and uncontrolled eating (Lim, Chie, & Teh, 2020).

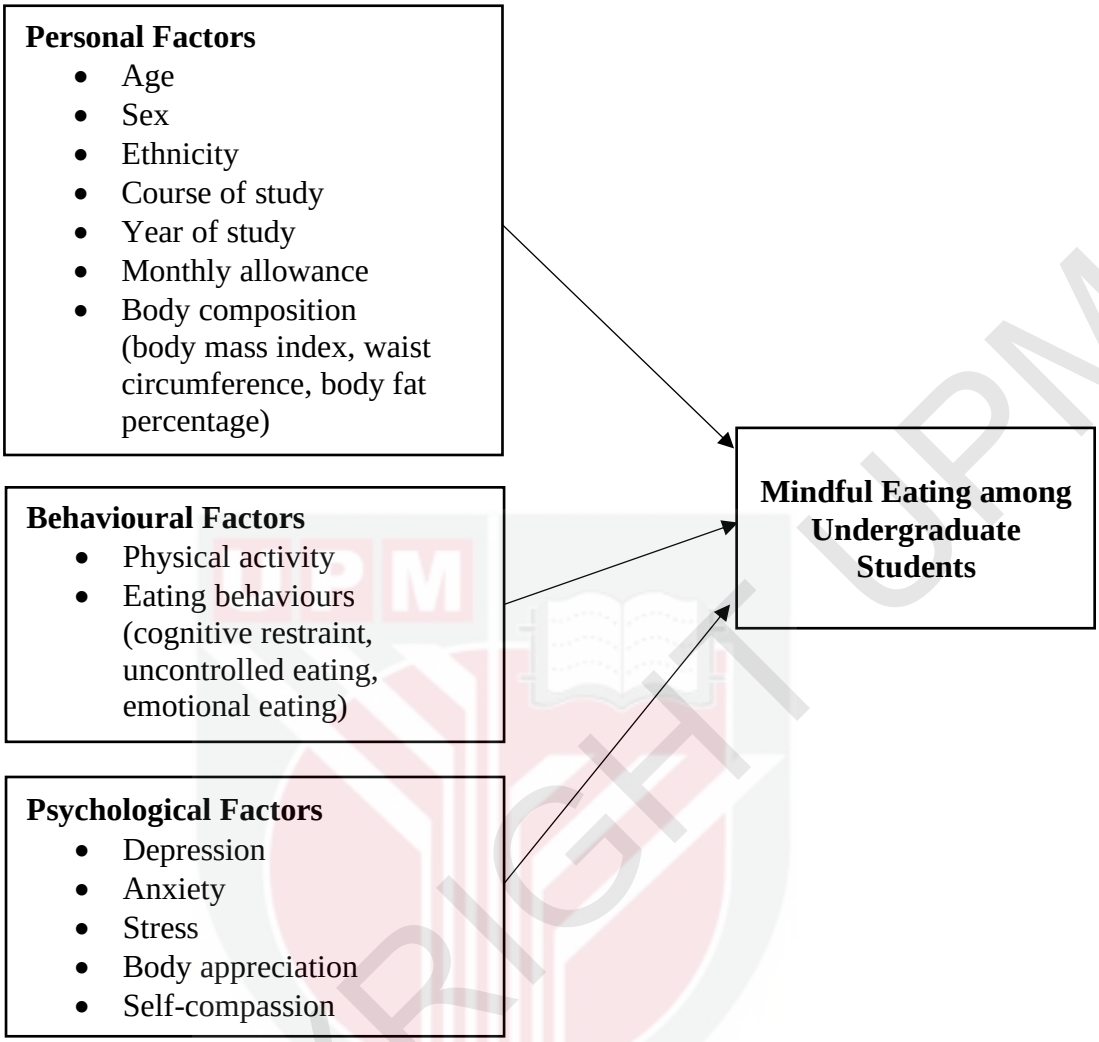


Figure 1.1 : Research framework of this study

Psychological factors such as depression, stress, anxiety, body appreciation and self-compassion are also important factors that are found to be associated with mindful eating. For example, a significant and negative correlation between mindful eating and anxiety was reported (Pintado-Cucarella & Rodríguez-Salgado, 2016). Body appreciation and self-compassion were positively related to mindful eating (Webb et al., 2018; Taylor et al., 2015). Besides, mindful eating was related to a lower level of depressive symptoms (Dalen, Smith, Shelley, Sloan, Leahigh, & Begay, 2010; Kristeller, Wolever, & Sheets, 2014).

CHAPTER 2

LITERATURE REVIEW

2.1 Overview of Mindful Eating

Mindful eating is conceptualized as being aware in the present moment when one is eating, paying close attention to the senses, including physical and emotional sensations (Moor et al., 2012). According to Framson et al. (2009), mindful eating can be used to describe a non-judgmental awareness of physical and emotional sensations while eating or in a food-related environment. Albers (2008) stated that mindfulness when eating focuses on the process of eating, not the types of foods eaten, in which it is not a diet approach that involves rules to follow. Albers (2008) identified three basic steps that are important to mindful eating. The first step involves noticing all the senses, tastes, smells, and textures to the food eaten. The second is recognizing repetitive habits such as eating while multitasking and eating on autopilot without being aware consciously. The third is being aware of what triggers the initiation and cessation of eating (Albers, 2008).

Mindful eating is operationally defined as food consumption that is driven by appropriate cues for eating. It involves high levels of eating inhibition, awareness of personal eating behaviour, and awareness of external cues to eat as well as low emotional responses to eating and engagement in distractive activities while eating (Framson et al., 2009). Studies found that mindful eating promotes assurance that it is

an effective approach for people who want to manage their weight effectively and improve the level of their health-care (Miller, Kristeller, Headings, Nagaraja & Miser, 2012).

In general, mindful eating involves slowing down the pace of eating (e.g., taking breaks during bites, chewing more slowly, taking a break to breathe and assess fullness), eating away from distractions such as the television or computer or eating in the car, becoming aware of the body's hunger and fullness cues and utilizing these cues to guide the decision to begin and end eating as opposed to following a regimented diet plan, acknowledging responses to food (likes, dislikes, neutral) without judgment, choosing to eat food that is both pleasing and nourishing by using all of the senses while eating, being aware of and reflecting on the effects caused by unmindful eating or known as mindless eating (such as eating out of boredom or sadness, overeating to the point of feeling uncomfortable); and meditation practice as a part of life (Mathieu, 2009). The difference between mindful eating and mindless eating (Willard, 2019) is shown in Table 2.1.

Table 2.1 : The difference between mindful eating and mindless eating

Mindful Eating	Mindless Eating
• Listening to the body and stopping when full	• Eating past full and ignoring the signal from the body
• Eating when the body tells to eat (i.e., stomach growling, energy low)	• Eating when feelings and emotions tell to eat (i.e., lonely, sad, bored, stress)
• Eating with others, at specified times and places (i.e., sitting at a real table)	• Eating alone, at random times and places (i.e., eating while doing assignments)
• Consuming foods that are nutritionally healthy	• Eating emotionally comforting foods
• When eating, just eating	• Eating and multitasking
• Considering where food comes from	• Considering a meal as an end product

Source: Willard (2019)

A recent study done by Giannopoulou, Kotopoulea-Nikolaidi, Daskou, Martyn and Patel (2020) among 221 health-related disciplines students from the University of Brighton, United Kingdom found the mean score of mindful eating was 3.11±0.03, in which the lowest score reported was disinhibition subscale (2.54±0.04) indicating university students had low ability to stop eating when full. Another cross-sectional study conducted by Anderson et al. (2015) among 125 undergraduate students in northeastern university in the United States reported that the mindful eating score was 2.80±0.30 by using the MEQ.

A study conducted by Moor et al. (2012) among 90 students at a southeastern university in the United States found that the mean score of mindful eating based on the Mindful Eating Questionnaire (MEQ) was 2.89±0.32, while the means for subscale score were 2.99±0.56 for disinhibition, 2.59±0.47 for awareness, 2.65±0.55 for external cues, 3.17±0.67 for emotional response and 3.04±0.58 for distraction subscales.

Besides, a recent local cross-sectional study conducted by Salwani et al. (2019) found that the mean MEQ total score among 300 Malaysian health science students was 2.68±0.24, where the mean score of awareness subscale was the highest (2.79±0.48) and the mean score of disinhibition subscale was the lowest (2.49±0.55). The low mean in the disinhibition subscale indicates that the students had difficulty in identifying satiety and hunger cues (Salwani et al., 2019).

Mindful eating practices should be a concern to help undergraduate students in improving their eating behaviours. A better understanding on mindful eating and its associated factors might contribute to more effective and appropriate nutrition intervention and health promotion programs focusing on healthy eating practices among undergraduate students.

2.2 Comparison of Mindful Eating by Different Socio-demographic Status

2.2.1 Age

A study done by Berdal (2012) among 427 midwestern university students in United States found that older age over 24 years old had higher mindful eating score (M=2.50) compared those younger age (18-20 years old = 2.48, 21 to 23 years old = 2.45). However, it was statistically not significant (Berdal, 2012). A cross-sectional study conducted by Framson et al. (2009) among respondents at fitness facility, preparatory school, software company and non-profit company in United States found older age group (≥30 years old) had significantly higher mindful score than younger age group (2.99 vs 2.79, p<0.01). In contrast, a recent published study by Köse and Çıplak (2020) among 368 undergraduate students in Uludağ University, Turkey found that as age increased, mindful eating score decreased.

2.2.2 Sex

A cross-sectional study conducted by Berdal (2012) among 427 students in midwestern university United States found that females had significantly higher score of mindful eating (M=2.52) compared to males (M=2.40; p<0.001). Similarly, Giannopoulou et al. (2020) found that female students in the University of Brighton, United Kingdom had significantly higher scores of mindful eating compared to male students (p<0.05). However, a recent published study done by Köse and Çıplak (2020) among 368 undergraduate students in Uludağ University, Turkey found that males had higher mindful eating scores (3.29±0.37) compared to females (3.23±0.38). Yet, no statistically significant difference was found in mindful eating scores between males and females (p=0.218) (Köse & Çıplak, 2020).

2.2.3 Ethnicity

Only one previous study examined on ethnicity and mindful eating, which was conducted among third-to-fifth graders of Hispanic and non-Hispanic white from two low income schools (Pierson et al., 2016). Results showed that ethnicity was not associated with mindless eating in the United States (Pierson et al., 2016).

2.2.4 Course of Study

A cross-sectional study done by Davis et al. (2014) among 285 undergraduate students in the United States found that mindful eating was higher in health majors/minors (p=0.0105) and also higher in those with a college nutrition course (p=0.0078). However, a study carried out by Bryan (2016) among 37 students aged 18 to 24 years old of Saint Peter's University in the United Stated that registered for one semester long (three months and twenty days) nutrition course entitled Nutrition in Health and Disease showed no significant change in mindful eating score from pre to post-test taking nutrition course but the result showed an increasing trend (mean of pre 2.77, mean of post 2.83). Another study conducted by Berdal (2012) among 427 students of Midwestern University in the United States enrolled in two lower level nutrition classes (general education nutrition course vs. a health science major) showed that no significant difference was found between general education nutrition course (M=2.44) and health science major (M=2.47). Berdal (2012) further analysed the difference on mindful eating subscales and found a significant difference in external cues subscale. Results showed that the health science major had higher awareness of external cues subscale (M=3.09) than general education nutrition course (M=2.94) (Berdal, 2012).

2.2.5 Year of Study

A study done by Berdal (2012) reported that higher year of study had higher mindful eating score (junior *M*=2.52, senior *M*=2.47) than lower year of study (freshman *M*=2.46, sophomore *M*=2.44). However, no significant difference was found (Berdal, 2012). In contrast, another cross-sectional study done by Pierson et al. (2016) found that students in higher year of study (fifth graders) showed significantly more mindful eating compared to students in lower year of study (third graders).

2.2.6 Monthly Allowance

There was no previous study had been conducted to compare differences in mindful eating score with monthly allowance.

2.3 Relationship of Body Composition and Mindful Eating

A study conducted by Moor et al. (2012) among 90 students at a medium-sized southeastern university in the United States reported a significant negative correlation between BMI and overall mindful eating score (r =−0.28, p = 0.005). Significant negative correlation was also found between BMI and the disinhibition (r =−0.31, p=0.002) and emotional eating (r=−0.30, p=0.003) subscale scores in the MEQ (Moor et al. 2012). However, Moor et al. (2012) found that there were no significant correlations between BMI and the awareness subscale score (r =−0.10, p=0.19), distraction subscale score (r=0.07, p=0.28) and external subscale score (r=−0.11, p=0.16).

Framson et al. (2009) reported that MEQ score was negatively associated with BMI (3.02 for BMI <25 vs 2.54 for BMI > 30, p<0.001). For each BMI groups (<25, 25 to <30, and ≥30), the MEQ scores were 3.02, 2.77 and 2.54, respectively (p<0.001). The researchers stated that higher BMI was associated with lower scores on all MEQ

subscales while the largest difference between BMI categories was emotional response subscale. It showed that the mean score of emotional response subscale across BMI categories (<25, 25 to <30, and ≥30) were 3.21, 2.82 and 2.50.

Besides, a recent cross-sectional study conducted by Salwani et al. (2019) among 300 Malaysian health science students found that mindful eating significantly predicted the BMI of university students (β=-0.15, p<0.05). Another study found similar findings where an individual who practiced mindful eating was less likely to be obese, in which results showed that higher BMI was associated with lower scores on MEQ subscales (Fred Hutchinson Cancer Research Center, 2009). This study also stated that an individual who aware why they ate and stopped when full, having less body weight than those who ate mindlessly, who ate when not hungry or in response to anxiety or depression. The researchers also suggested that mindful eating may play an important role in long-term weight maintenance. However, a study done by Taylor et al. (2015) reported an opposite finding, in which no significant correlation between mindful eating and BMI (r= -0.11, p>0.05) was reported.

In term of waist circumference, a study done by Grinnell et al. (2011) on first semester university students in the University of Rhode Island, United States found higher waist circumferences in less mindful group (78.6 cm ± 9.4 cm) than more mindful group (74.7 cm ± 7.1 cm). Findings showed that waist circumference was significantly higher in less mindful group (p<0.05) compared to more mindful group. But no significant association was found between BMI and mindful eating.

A study among 210 university students from the University of Banja Luka, Bosnia and Herzegovina stated that body fat percentage was partially positive correlated (p < 0.05) with intake of unhealthy food and negatively with consumption of healthy food (Raseta, Simovic, Djuric, Suzic, Prtina, & Zeljkovic, 2018).

Hendrickson and Rasmussen (2016) reported that individuals with high body fat percentage make more impulsive food choices compared to those with low body fat percentage; mindful eating was a beneficial strategy to reduce impulsive food choice. However, there was no study examining the relationship between body fat percentage and mindful eating.

2.4 Relationship of Behavioural Factors and Mindful Eating

2.4.1 Physical Activity

A cross-sectional study found a strong association between yoga practice and mindful eating but no association between other types of physical activity, such as walking or running, and mindful eating (Fred Hutchinson Cancer Research Center, 2009). Similarly, Framson et al. (2009) found that mindful eating score had positive association with yoga. Researchers added that there were no or very week inverse associations of other physical activity measures such as walking and exercise with MEQ score. Walking more than 200 minutes per week was associated with lower mindful eating score (β=0.13±0.06, p<0.05) (Framson et al. 2009).

A study done by Moor et al. (2012) among 90 students at a 4-year southeastern university in the United States found that minutes of physical activity per week was not related significantly to overall mindful eating scores (r=0.17, p=0.05). However, significant negative correlation was found between minutes of physical activity per week and the awareness (r =−0.19, p=0.04) and also emotional eating (r=−0.20, p=0.03) subscale scores (Moor et al., 2012). Other subscales scores which were disinhibition, external cues and distraction showed no significant correlations with minutes of physical activity (Moor et al., 2012).

Grinnell et al. (2011) determined whether mindfulness was associated with physical and behavioural measures in first semester university students in the University of Rhode Island, United States. They found that mindfulness using Mindful Attention Awareness Scale (MAAS) was negatively correlated with personal barriers to being physically active using with Weight-Related Behavior Questionnaire (WRBQ-PB) (r=-0.50, p<0.01). In addition, personal barriers to being physically active was significantly higher in less mindful group (2.6±0.8) compare to more mindful group (1.9±0.6). The study also stated that respondents with increased mindfulness had lower susceptibility to less personal barriers to physical activity (Grinnell et al., 2011).

2.4.2 Eating Behaviours

According to Kavazidou et al. (2012), cognitive restraint behaviour was defined as "*conscious restriction of food intake in order to control body weight or to promote weight loss*", uncontrolled eating behaviour as "*tendency to eat more than usual due to a loss of control over intake accompanied by subjective feelings of hunger*" and emotional eating behaviour as "*inability to resist emotional cues*". A cross-sectional study conducted by Anderson et al. (2015) among 125 undergraduate students in northeastern university in the United States reported that the mindful eating score was not significantly related with overall score of restraint subscale (r=-0.08, p>0.05). Framson et al. (2009) found that cognitive restraint was inversely related with all mindful eating subscales.

An intervention study by Gidugu and Jacobs (2018) among 46 individuals with serious mental illness (SMI) participated over four rounds of the 14-week to develop healthy eating habits through mindful eating program found positive change in

uncontrolled eating as in the expected direction, but the result was not significant (t=−1.807, p=0.079). According to Lim et al. (2020), an individual with high uncontrolled eating was prone to loss of self-control in intake of food and had tendency to consume more than usual.

Grinnell et al. (2011) found that mindfulness was negatively associated emotional eating (r=-0.26, p<0.01). Emotional eating was significantly higher in less mindful group (2.1±1.0) compared to more mindful group (1.7±0.8). The study also stated that respondents with increased mindfulness had lower susceptibility to emotional eating (Grinnell et al., 2011).

2.5 Relationship of Psychological Factors and Mindful Eating

2.5.1 Depression

Depression is a common illness worldwide, with an estimated 350 million people affected (WHO, 2012). Depression is known as a negative emotion and feeling that can cause impairment and limit someone's ability to work normally (IPH, 2017). The prevalence of depression was 2.3% among Malaysian adults, equivalent to half a million people and female adults had higher prevalence of depression (2.6%) compared to males (2.0%) (IPH, 2019). Previous studies on depression among university students in Malaysia found that the prevalence of moderate to extremely severe level of depression was ranging from 13.9% to 29.3% (Teh, Ngo, Rashidatul Aniyah, Vellasamy, & Suresh, 2015), 21% (Nurul Syafika et al., 2019), moderate severity or above was 29.3% (Gan et al., 2011b), and 29.4% experienced depression, whereas 25.0% had moderate depression and 4.4% had severe depression (Md. Ashraful, Wah, Wen, Claire, & Adina, 2018).

A cross-sectional study conducted by Winkens et al. (2018) in three European countries namely Denmark, Spain and Netherlands using Mindful Eating Behaviour Scale (MEBS) and Center for Epidemiologic Studies Depression Scale (CES-D) found that domains of focused eating, eating with awareness and eating without distraction were significant negatively associated with depressive symptoms and depression in all three countries. While the domain hunger and satiety cues which only measured in the Netherlands was significantly positively associated with depressive symptoms in the adjusted models (B = 0.09, 95% CI: 0.02, 0.16), but not with depression. Findings showed that higher levels on three mindful eating domains namely focused eating, eating with awareness and eating without distraction were consistently associated with a lower level of depressive symptoms and lower risk to have depression. Mindful eating interventions help to lower depressive symptom level (Dalen et al., 2010; Kristeller et al., 2014; Pidgeon, Lacota, & Champion, 2012).

2.5.2 Anxiety

American Psychological Association (2008) defines anxiety as *"an emotion characterized by feelings of tension, worried thoughts and physical changes like increased blood pressure".* Anxiety can lead to increased appetite and seek for higher calorie foods resulting in a chain reaction in which the individual was unable to better understand the mood-consumption relationship (Hulbert-Williams, Nicholls, Joy, & Hulbert-Williams, 2013). Long-term improvements in eating behaviour are able to occur if anxiety is being addressed because perceived anxiety was one of the strong contributors to emotional eating (Levitan & Davis, 2010; Pintado-Cucarella & Rodríguez-Salgado, 2016). The prevalence of moderate to extremely severe level of anxiety ranged from 50.0% to 55.0% (Teh et al., 2015; Nurul Syafika et al., 2019).

Pintado-Cucarella and Rodríguez-Salgado (2016) analysed the relationship between mindful eating and BMI, binge eating, anxiety and negative affect among 216 Mexican students who practiced sport regularly, university athletes, yoga practitioners and persons suffering from obesity. They found a significantly negative correlation between mindful eating and anxiety (r=−0.252, p<0.010). The researchers stated that those with less awareness of their eating habits were generally more anxious, in which they demonstrated less control over their eating habits (Pintado-Cucarella & Rodríguez-Salgado, 2016).

2.5.3 Stress

According to National Institute of Mental Health (2019), stress was defined as how human's brain and body respond to any type of challenge such as performance at work or school, a major life change, or a traumatic experience. A previous local study by Ranita, Sohana and Marhaini (2019) reported that 3.3% of the undergraduate students in Kolej Universiti Islam Antarabangsa Selangor had severe stress level and none had extremely severe stress level (normal = 65.9%, mild = 19.8%, moderate = 11.0%). Another study done by Teh et al. (2015) reported that the mean stress score of students was 12.7 ± 12.8 (moderate = 10.8%, severe = 5.0%, extremely severe = 0.8%).

Limited study was conducted to determine the relationship between stress and mindful eating. A cross-sectional study by Finger, de Freitas and Oliveira (2018) among 243 people with a BMI of at least 25 kg/m^2 and aged from 18 to 60 years old found that those with stress without symptoms ('no symptoms' or 'mild symptoms') had higher mean mindful eating score (2.50 ± 0.358) than stress with symptoms individuals ('moderate symptoms' or 'severe symptoms') (2.37 ± 0.348; p=0.005).

2.5.4 Body Appreciation

Body appreciation, the more general definition of positive body image, represents holding positive attitudes towards one's body, cares for the body by adaptive health behaviours, values one's body and protects the body by rejecting the ideal narrow-defined media as the exclusive beauty metric (Tylka & Wood-Barcalow, 2015).

Limited study was conducted to determine the relationship between body appreciation and mindful eating. There is only one study determining the relationship between body appreciation and mindful eating (Webb et al., 2018). Webb et al. (2018) found that mindful eating was positively correlated with body appreciation (r=0.34, p<0.01) among 333 undergraduate females attending a large publicly funded institution located in the United States. The researchers added that more frequent mindful eating corresponded with higher level of body appreciation (Webb et al., 2018).

2.5.5 Self-compassion

Self-compassion is defined as being open to one’s personal failures, insufficiencies, and suffering and to react to them with common humanity, mindfulness, and self-kindness (Neff, 2003). Common humanity includes viewing personally challenging experiences as common human experiences. Self-compassion is a kinder approach toward oneself during personally difficult times, with a mindful awareness and understanding that one’s experiences are part of what all people go through (Neff, 2003).

According to Hudnall (2019), self-compassion is the element that frequently missed in healthy eating and it has the ability to ensure a person make success to eat

well or break it. Hudnall (2019) stated that evidence showed the more tolerant and respectful a person toward themselves, the more driven they were to do what they need, like eating properly, in order to take care of themselves. Kelly, Vimalakanthan, and Carter (2014) added that self-compassion often tends to encourage fewer maladaptive body- and eating-related behaviour. Yet, self-compassion in the context of eating behaviours was underexplored (Mantzios et al., 2018a).

A study done by Taylor et al. (2015) among 150 university students in the United States found that self-compassion was positively correlated with mindful eating, where higher self-compassion related to higher mindful eating (r=0.34, p<0.01). Similarly, another cross-sectional study done by Mantzios et al. (2018a) among 257 university students in the United Kingdom using the Mindfulness Eating Scale (MES) and Self-Compassion Scale (SCS) reported a significant positive relationship between self-compassion and mindful eating (r=0.352, p<0.001). Likewise, another cross-sectional study done by Mantzios et al. (2018b) among 546 undergraduate students in the United Kingdom also found a moderate and significant positive relationship between self-compassion and mindful eating (r=0.378, p<0.001).

CHAPTER 3

METHODOLOGY

3.1 Study Design

This was a cross-sectional study aimed to determine factors associated with mindful eating among undergraduate students in Universiti Puta Malaysia (UPM).

3.2 Study Location

This study was carried out at UPM. UPM is one of the 20 public universities and one of the five research universities (Ministry of Education Malaysia, 2019) in Malaysia that is located at Serdang, Selangor. It is next to Malaysia's administrative capital city; Putrajaya and it is about 19 km from Federal Territory of Kuala Lumpur. There are 15 faculties in UPM Serdang Campus with approximately 11,981 undergraduate students (UPM, 2018).

3.3 Sample Size Determination

The sample size of this study was calculated by using the Pearson correlation sample size formula by Hulley, Cummings, Browner, Grader and Newman (2013) as shown below.

$$N = \left[\frac{(Z_\alpha + Z_\beta)}{c}\right]^2 + 3$$

$$c = 0.5 * ln\left[\frac{(1+r)}{(1-r)}\right]$$

The standard normal deviate for Z_α = 1.96

The standard normal deviate for Z_β = 0.84

The expected correlation coefficient = r

Table 3.1 shows the sample size calculation of the relationships between different factors and mindful eating based on correlation coefficients of previous studies.

Table 3.1 : Sample size calculation

Independent Variables	Correlation, r	Sample size, n
Body mass index and mindful eating (Mantzios et al., 2018a)	r = -0.281	c = 0.5 * ln [(1 + [-0.281]) / (1 – [-0.281])] = -0.289 n = [(1.96 + 0.84) / (-0.289)]^2 + 3 = 96.87 ~ 97
Physical activity and mindful eating (Grinnell et al., 2011)	r = -0.50	c = 0.5 * ln [(1 + [-0.50]) / (1 – [-0.50])] = -0.549 n = [(1.96 + 0.84) / (-0.549)]^2 + 3 = 29.01 ~ 30
Depression and mindful eating (Pidgeon et al., 2012)	r = -0.47	c = 0.5 * ln [(1 + [-0.47]) / (1 – [-0.47])] = -0.510 n = [(1.96 + 0.84) / (-0.510)]^2 + 3 = 33.1 ~ 34
Anxiety and mindful eating (Pintado-Cucarella & Rodríguez-Salgado, 2016)	r = -0.252	c = 0.5 * ln [(1 + [-0.252]) / (1 – [-0.252])] = -0.258 n = [(1.96 + 0.84) / (-0.258)]^2 + 3 = 121.2 ~ 122
Body appreciation and mindful eating (Webb et al., 2018)	r = 0.34	c = 0.5 * ln [(1 + 0.34) / (1 – 0.34)] = 0.354 n = [(1.96 + 0.84) / (-0.354)]^2 + 3 = 65.6 ~ 66
Self-compassion and mindful eating (Taylor et al., 2015)	r = 0.34	c = 0.5 * ln [(1 + 0.34) / (1 – 0.34)] = 0.354 n = [(1.96 + 0.84) / (0.354)]^2 + 3 = 65.6 ~ 66

The highest number of sample size was selected as the final sample size of this study, which was 122 respondents based on Table 3.1. Additional adjustment in computing the sample size was shown in Table 3.2.

Table 3.2 : Additional adjustments in computing the sample size

Criteria	Calculation
Adjusted for estimated sample design effect (Aday & Cornelius, 2006):	122 x 1.3 = 158.6 ≈ 159
Adjusted for expected response rate (71.1%; Gan, Chin, & Law 2019):	159 ÷ 0.711 = 223.6 ≈ 224
Adjusted for the expected proportion eligible (90%; Aday & Cornelius, 2006):	224 ÷ 0.90 = 248.9 ≈ 249

Therefore, after considering design effect, response rate and proportion of eligibility, the minimum sample size required in this study was 249 respondents.

3.4 Sampling Design

Multistage sampling method was used in this study as shown in Figure 3.1. There were 15 faculties in UPM that were divided into three different fields of study, namely arts and social sciences (N=4), sciences (N=9) and technical (N=2). One faculty was randomly selected from each field of study, which were Faculty of Economics and Management, Faculty of Medicine and Health Sciences and Faculty of Engineering. Then, one study program was randomly selected from each of the selected faculties. All students from first year to final year in each selected study program were invited to participate in this study (n=694). A total of 276 students participated in this study, with a response rate of 39.8%. The low response was due to Movement Order Control (MCO) that was implemented in Malaysia since 18th March 2020 because of the COVID-19 outbreak.

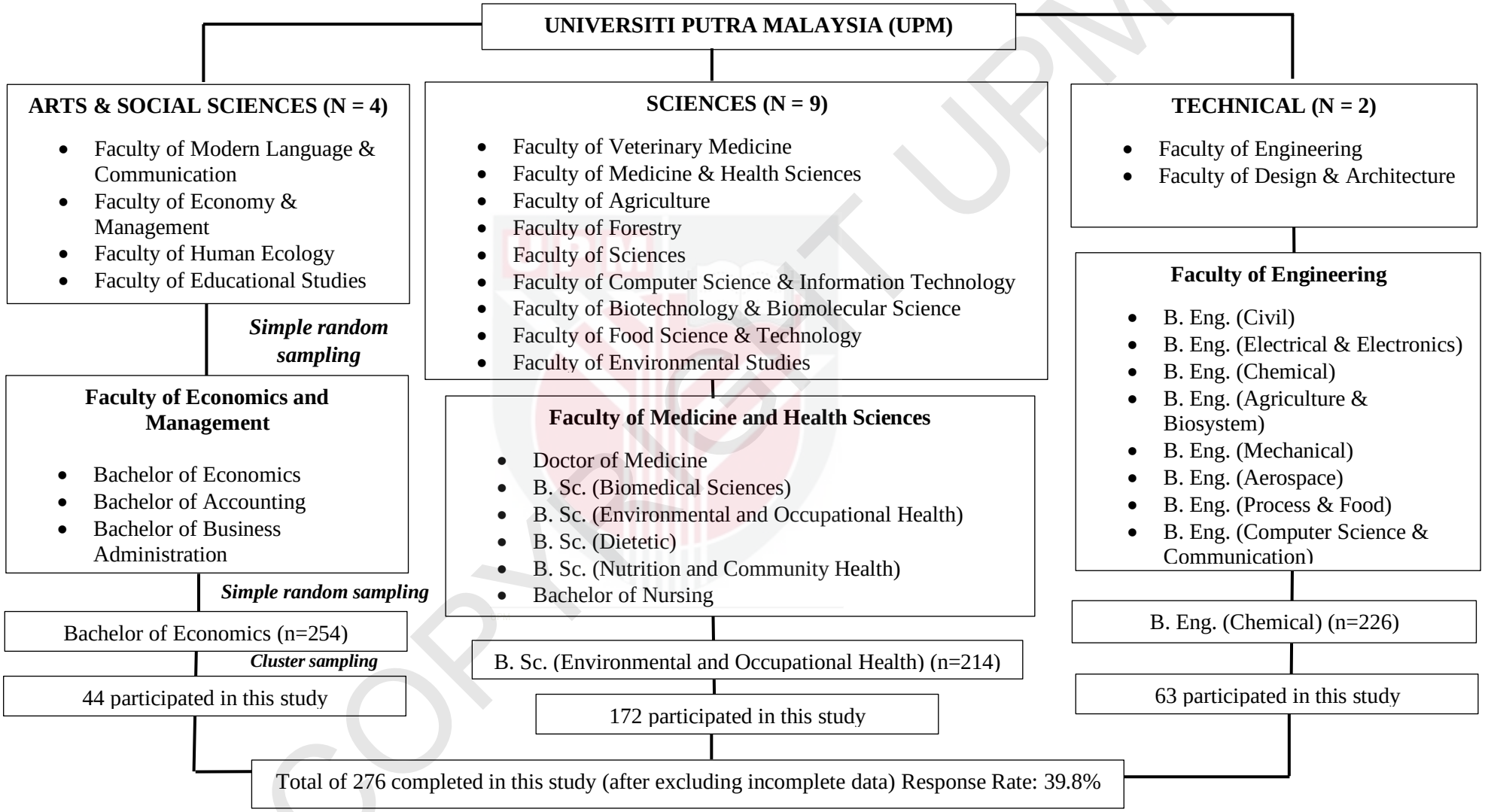


Figure 3.1 : Sampling design

3.5 Respondents

This study was conducted among undergraduate students in UPM. Respondents were selected based on the inclusion and exclusion criteria as stated in Table 3.3.

Table 3.3 : Inclusion and exclusion criteria for respondents of this study

Inclusion Criteria	Exclusion Criteria
• Malaysian • Undergraduate students • Age 19-25 years old • Female or male	• Physical disability • Pregnant students • Presence of chronic illnesses such as diabetes mellitus, heart disease, kidney disease and liver disease

3.6 Study Instruments

An English language online survey was used in this study to obtain information on personal factors, behavioural factors and psychological factors. Anthropometry measurements (body weight, height, waist circumference and body fat percentage) were conducted by the researcher. Detail descriptions of the study instruments were discussed below.

3.6.1 Self-administered Questionnaire

3.6.1.1 Personal Factors

Personal information consisted of age, sex, ethnicity, course of study, year of study and monthly allowance were self-reported by the respondents.

3.6.1.2 Mindful Eating

The 28-item Mindful Eating Questionnaire (MEQ) by Framson et al. (2009) was used to measure mindful eating of the respondents in this study. This MEQ

consisted of five subscales that related to eating which were ability to understand and stop eating when full (disinhibition; 8 items), awareness of physiological and psychological experiences (awareness; 7 items), awareness of external cues (external cues; 6 items), not eating in response to negative emotions (emotional response; 4 items); and attentiveness (distraction; 3 items). The items were rated along a 4-point Likert scale ranging from 1 (never/rarely) to 4 (usually/always). Each subscale score was calculated as the mean of items, excluding those with a "not-applicable" response. There were five questions with a "not-applicable" response choice. The summary score was the mean of the five subscales. The overall scores ranged from 1 to 4, where higher scores indicating greater degree of mindful eating.

The MEQ showed adequate construct validity and reliability, with a Cronbach's alpha value of 0.64 (Framson et al., 2009). Each subscale also showed good internal consistency reliability, with Cronbach's alpha values ranging from 0.64 to 0.83 (Framson et al., 2009). This MEQ had been used among Malaysian university students (Salwani et al., 2019). In the current study, this scale showed a good internal consistency reliability with a Cronbach's alpha value of 0.825.

3.6.1.3 Physical Activity

The 16-item Global Physical Activity Questionnaire (GPAQ) by World Health Organization (2012) was used to determine physical activity level of the respondents in this study. It collected physical activity information on three domains (activity at work, travel to and from places and recreational activities) and sedentary behaviour. Metabolic Equivalent (MET)-min/week was used to analyse the respondents' answers. MET was calculated based on following MET level: walking = 4.0 METs, moderate = 4.0 METs and vigorous = 8.0 METs. MET formula as shown below:

MET-min per week = MET level × minutes of activity/day × days per week

The respondents' scores were categorized into three categories which were low (< 600 MET-min/week), moderate (at least 600–2,999 MET-min/week) or high (3,000+ MET-min/week).

According to WHO, GPAQ has been used in more than 100 countries. A validity study of GPAQ on nine countries including Asia countries (Indonesia, India, China, Bangladesh and Japan) showed reliability coefficients were of moderate to substantial strength (Kappa 0.67 to 0.73; Spearman's rho 0.67 to 0.81) while results on criterion validity were in the poor-fair (range 0.06 to 0.35) (Bull, Maslin & Armstrong, 2009). GPAQ had been used to assess physical activity among Malaysian adults (Ahmad Taufik et al., 2016; Azahadi, Lim, Hazizi, Khoo, Siti Fatimah, & Joanita, 2015) and it showed good validity and reliability (Chu & Moy, 2015; Soo, Wan Abdul Manan, & Wan Suriati, 2015).

3.6.1.4 Eating Behaviours

The 18-item Three-Factor Eating Questionnaire Revised (TFEQR-18) by Karlsson, Persson, Sjöström and Sullivan (2000) measured three eating concepts which were cognitive restraint (6 items), uncontrolled eating (9 items) and emotional eating domains (3 items). Total of 17 items were rated along a 4-point Likert scale ranging from 1 (definitely false) to 4 (definitely true) and one item was rated with 1-8 scale. The range of subscale scores were 6 to 28 for cognitive restraint, 9 to 36 for uncontrolled eating and 3 to 12 for emotional eating. Higher scores indicated more dysfunctional eating patterns. A study reported that this questionnaire showed a valid measure of eating behaviour not only in the obese but also in the general population

(Anglé et al., 2009). The Cronbach's alpha for TFEQR-18 was 0.83 (Mantzios et al., 2018b). It had been used among Malaysian university students (Kristanto, Chen, & Thoo, 2016; Lek, Ong, & Say, 2018). In the current study, this scale showed acceptable internal consistency reliability with Cronbach's alpha values of 0.634 for cognitive restraint, 0.762 for uncontrolled eating and 0.758 for emotional eating.

Furthermore, the Youth Risk Behavior Survey by Centers for Disease Control and Prevention (2019) was adapted to measure about food that respondents eat or drink for the past 7 days. Respondents thought about all the meals and snacks they had from the time they got up until they went to bed. They need to include food they eat at home, at school, at restaurants, or anywhere else. It consisted of questions on how many times respondents drink or eat 100% fruit juices, fruits, vegetables, bread/rice/mi/mihun, meat/chicken, fish, legumes, soft drinks, sports drinks, plain water, and milk.

3.6.1.5 Depression, Anxiety, Stress

The 21-item Depression Anxiety Stress Scale (DASS-21) by Lovibond and Lovibond (1995) was used to measure psychological states namely depression, anxiety and stress of the respondents in this study. Each subscale in DASS-21 consisted a total of seven items. The items were rated along a 4-point Likert scale ranging from 0 (did not apply to me at all), 1 (applied to me to some degree, or some of the time), 2 (applied to me to a considerable degree, or a good part of time), and 3 (applied to me very much, or most of the time). The subscale scores were summed. Scores for depression, anxiety and stress were calculated by summing the scores for the relevant items. The total score for each subscale ranged from 0 to 21. The respondents' scores were categorized into different severity rating indices, which included normal (depression 0-4, anxiety 0-3, stress 0-7), mild (depression 5-6, anxiety 4-5, stress 8-9), moderate (depression 7-10,

anxiety 6-7, stress 10-12), severe (depression 11-13, anxiety 8-9, stress 13-16), and extremely severe (depression 14+, anxiety 10+, stress 17+).

DASS-21 showed good convergent validity and adequate construct validity (Henry & Crawford, 2005; Noorlila, Samsilah, Shamsuddin, Shureen Faris, & Abu Yazid, 2018). The subscale also showed good internal consistency reliability: 0.910 for DASS-Depression, 0.85 for DASS-Anxiety, and 0.859 for DASS-Stress (Noorlila et al., 2018). This scale had been used among Malaysian university students (Amalia & Mohd Saizam, 2015; Noorlila et al., 2018; Talwar et al., 2016). In the current study, this scale showed a good internal consistency reliability with Cronbach's alpha values of 0.900 for depression, 0.799 for anxiety and 0.850 for stress.

3.6.1.6 Body Appreciation

The 10-item Body Appreciation Scale-2 (BAS-2) by Tylka and Wood-Barcalow (2015) was used to assess respondent's acceptance of and respect for their own bodies. The items were rated on a 5-point Likert scale ranging from 1 (Never) to 5 (Always). The score was calculated using average respondents' responses for items 1–10. The total score ranged from to 1 to 5. Higher scores indicated greater levels of body appreciation. BAS-2 had high internal consistency reliability, with Cronbach alphas of 0.97 and 0.96 for women and men respectively (Tylka & Wood-Barcalow, 2015). BAS-2 showed adequate internal consistency coefficients and adequate indices of construct and incremental validity among Malaysian adults (Swami, Nor Azzatunnisak, Toh, Hanoor Syahirah, Todd, & Barron, 2019). In the current study, this scale showed a good internal consistency reliability with Cronbach's alpha value of 0.963.

3.6.1.7 Self-compassion

The 12-item Self-Compassion Scale–Short Form (SCS-SF) by Raes, Pommier, Neff, and Van Gucht (2011) was used to measure self-compassion of the respondents in this study. SCS-SF assessed the respondents' tendency to be self-compassionate during times of distress and disappointment. It consisted of six subscales which were self-kindness (2 items), self-judgment (2 items), common humanity (2 items), isolation (2 items), mindfulness (2 items) and over-identification (2 items). The items were rated along a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always), with overall scores ranging from 12 to 60. Self-compassion scores were calculated by reverse score the self-judgment, isolation and over-identification items then summing all six subscale means. The internal consistency reliability was good with a Cronbach's alpha value of 0.84 for the overall scale (Taylor et al., 2015). Each subscale also showed good internal consistency reliability, with Cronbach's alpha values ranging from 0.55 to 0.81 (Raes et al., 2011). In this study, this scale showed a good internal consistency reliability with Cronbach's alpha value of 0.855.

3.6.2 Anthropometry Measurements

3.6.2.1 Body Mass Index (BMI)

Body weight of the respondents was measured using a TANITA Digital Weighing Scale HD-319 (TANITA Corporation, Arlington Height, IL, USA). The reading was taken to the nearest 0.1kg. Height was measured using a SECA Portable Stadiometer 213 (SECA, Hamburg, Germany). The reading was taken to the nearest 0.1cm. Body Mass Index (BMI) was calculated using body weight and height as shown below.

$$Body\ Mass\ Index\ (BMI) = \frac{body\ weight\ (kg)}{height\ (m^2)}$$

BMI classification as shown in Table 3.4 was used to categorize body weight status (WHO, 2000).

Table 3.4 : The classifications of Body Mass Index (BMI)

Classification	Cut-off points (kg/m^2)
Underweight	< 18.50
Normal weight	18.50 – 24.99
Overweight	> 25.00
Preobese	25.00 – 29.99
Obese Class I	30.00 – 34.99
Obese Class II	35.00 – 39.99
Obese Class III	≥ 40.00

Source: World Health Organization (2000)

3.6.2.2 Body Fat Percentage

Body fat percentage of the respondents was measured using an Omron Body Fat Monitor HBF-302 (Omron Matsusaka Co. Ltd, Matsusaka, Japan) to the nearest 0.1%. The classification of body fat percentage was classified as shown in Table 3.5 below (Lee & Nieman, 2003).

Table 3.5 : The classifications of body fat percentage

Classification	Males	Females
Unhealthy range (too low)	≤ 5%	≤ 8%
Acceptable range (lower end)	6 - 15%	9 – 23%
Acceptable range (upper end)	16 - 24%	24 – 31%
Unhealthy (too high)	≥ 25%	≥ 32%

Source: Lee and Nieman (2003)

3.6.2.3 Waist Circumference

Waist circumference was taken by measuring the smallest area between iliac crest and below the ribcage using Lufkin Executive Thinline Tape W606PM (Lufkin, TX, USA) to the nearest 0.1 cm. Waist circumference of ≥ 90 cm in men and ≥ 80 cm in women were considered at increased risk for abdominal obesity (WHO/IASO/IOTF, 2000).

3.7 Study Approval

Ethical approval was obtained from Ethics Committee for Research Involving Human Subjects of Universiti Putra Malaysia (JKEUPM; Reference Number: JKEUPM-2019-413; See Appendix A). Permission to conduct the study also was obtained from the deans of the selected faculties prior to data collection (See Appendix B).

3.8 Pre-testing

Prior to actual data collection, pre-testing was conducted on 30 students from Faculty of Medicine and Health Sciences. Those who meet the study criteria were qualified to involve in the pre-testing and were excluded from study sample. Pre-testing was conducted to assess the appropriateness of the questionnaire and to ensure that the instructions and the statements were understandable, clear and without ambiguity. Participants spent about 35 minutes to complete the questionnaire.

3.9 Procedures

Data collection was conducted from 24th February to 10th April 2020. However, on 18th March 2020, Malaysian government has implemented Movement Control Order (MCO) due to COVID-19 pandemic outbreak in the country that restricted face-to-face data collection. Thus, two phases of data collection were conducted namely before MCO and during MCO (Figure 3.2).

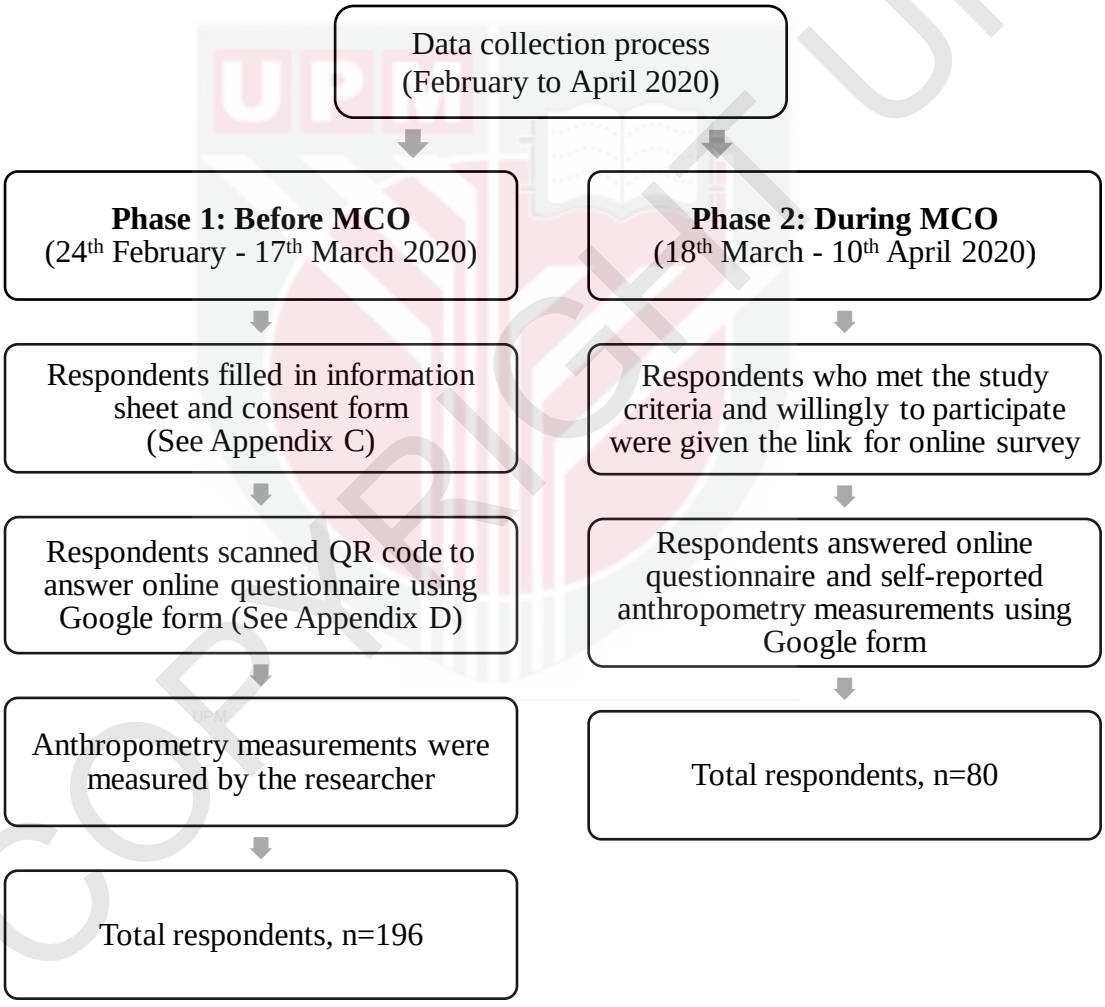


Figure 3.2 : Data collection process

Before MCO period, a day before data collection, respondents who met the study criteria were being reminded to stay back after a lecture or tutorial class. The respondents were given an information sheet (See Appendix C) containing a brief explanation on the objectives of the study. Respondents who agreed to participate in the study were required to sign a consent form (See Appendix C) prior to the data collection. The respondents scanned QR code to answer an online questionnaire (See Appendix D) using Google form at https://forms.gle/Yn6GzNmvwexthAhk6. After completing the online questionnaire, anthropometry measurements (body weight, height, waist circumference and body fat) were measured by the researcher. Respondents who completed the questionnaire and anthropometry measurements received a cereal product sample as a token of appreciation.

For data collection during MCO period, respondents who met the study criteria and willingly to participate were invited to answer online questionnaire and self-reported anthropometry measurements using Google form at https://forms.gle/CTw7UE7vF4UHASTM6. Although self-reported anthropometry measurements were used during MCO, no significant difference was found between self-reported and measurement by researcher in weight (t=1.149, p=0.252), height (t=-0.462, p=0.645), waist circumference (t=-0.801, p=0.424) and body fat percentage (t=0.602, p=0.548). Overall, a total of 276 respondents participated in this study, in which 196 were recruited before MCO and 80 during MCO period with a 39.8% response rate.

3.10 Data Analyses

All the statistical analyses were performed by using IBM SPSS Statistics 25 (IBM Corp., Armonk, New York, USA). Univariate analysis was used to analyse

descriptive data. Results of categorical variables were presented as frequencies and percentages. Results for continuous variables were presented as means and standard deviations. Independent samples *t*-test was used to compare mindful eating by different socio-demographic status. Pearson's product moment correlation test was used to determine the relationships between body composition, behavioural factors and psychological factors with mindful eating. The acceptable level of statistical significance for all tests was set at $p<0.05$.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Personal Factors

4.1.1 Socio-demographic Status

Table 4.1 shows the distribution of respondents according to their socio-demographic status. A total of 276 respondents (25.7% males and 74.3% females) with age ranged from 19 to 25 years old (*M*=20.61, *SD*=1.28 years old) participated in this study. Majority of the respondents were Malay (87.7%), health sciences students (62.0%), first year students (35.1%) and stayed in dormitory (84.8%). The median monthly allowance of the respondents was RM350 (*IQR*: 200 – 500), where half of them (55.4%) had monthly allowance ranging from RM201 to RM 500.

Table 4.1 : Socio-demographic status of the respondents (*n*=276)

Characteristics	Mean ± SD	n (%)
Age (years)	20.61 ± 1.28	
19		61 (22.1)
20		78 (28.3)
21		72 (26.1)
22		45 (16.3)
23		13 (4.7)
24		6 (2.2)
25		1 (0.4)
Sex		
Male		71 (25.7)
Female		205 (74.3)
Ethnicity		
Malay		242 (87.7)
Chinese		11 (4.0)

Table 4.1 : Socio-demographic backgrounds of the respondents (*n*=276) *(cont.)*

Characteristics	Mean ± SD	n (%)
Indian		13 (4.7)
Others		10 (3.6)
Course of study		
Bachelor of Environmental and Occupational Health		171 (62.0)
Bachelor of Chemical Engineering		63 (22.8)
Bachelor of Economics		42 (15.2)
Year of study		
First year		97 (35.1)
Second year		81 (29.4)
Third year		67 (24.3)
Fourth year		31 (11.2)
Current living arrangement		
Dormitory		234 (84.8)
Rented house		19 (6.9)
Own house		23 (8.3)
Monthly allowance (RM)	350 (200 – 500)[#]	
≤ 200		84 (30.4)
201 – 500		153 (55.4)
501 – 1000		35 (12.7)
≥ 1001		4 (1.5)

[#]Data were reported in median and interquartile range for not normally distributed data

4.1.2 Body Composition

The distribution of respondents' body composition by sex is described in Table 4.2. The average weight of the respondents in this study was 60.72 ± 15.57 kg where male respondents had higher body weight (73.01 ± 18.66 kg) than female respondents (56.91 ± 12.24 kg). Similar to a local study done by Yusoff et al. (2018) among 95 undergraduate students in Terengganu found that mean weight of the university students was 59.90 ± 13.30 kg, in which males had higher body weight (68.10 ± 1.32 kg) compared to females (56.70 ± 1.69 kg).

The mean height of the respondents in this study was 159.83 ± 7.92 cm, where male respondents were taller (170.08 ± 6.11 cm) than female respondents (156.65 ± 5.28 cm). A study conducted by Salwani et al. (2019) reported that the mean height of

Table 4.2 : Distribution of body composition of the respondents by sex

Variables	Mean ± SD / n (%)		
	Male (*n*=57)	Female (*n*=184)	Total (*n*=241)
Weight (kg)	73.01 ± 18.66	56.91 ± 12.24	60.72 ± 15.57
Height (cm)	170.08 ± 6.11	156.65 ± 5.28	159.83 ± 7.92
Body mass index (kg/m^2)	25.20 ± 6.18	23.17 ± 4.76	23.65 ± 5.19
Underweight	4 (7.0)	25 (13.6)	29 (12.0)
Normal weight	29 (50.9)	109 (59.2)	138 (57.3)
Overweight	15 (26.3)	31 (16.8)	46 (19.1)
Obese Class I	5 (8.8)	16 (8.7)	21 (8.7)
Obese Class II	1 (1.8)	2 (1.1)	3 (1.2)
Obese Class III	3 (5.3)	1 (0.5)	4 (1.7)
Waist circumference (cm)	82.16 ± 13.91	71.24 ± 9.88	73.85 ± 11.90
Normal	44 (80.0)	141 (80.6)	185 (80.4)
Abdominal obesity	11 (20.0)	34 (19.4)	45 (19.6)
Body fat percentage (%)	22.77 ± 7.69	30.23 ± 7.20	28.39 ± 7.98
Acceptable range (lower end)	9 (18.8)	30 (20.5)	39 (20.1)
Acceptable range (upper end)	20 (41.7)	58 (39.7)	78 (40.2)
Unhealthy (too high)	19 (39.6)	58 (39.7)	77 (39.7)

300 health sciences students was 1.59 ± 0.09 m. Another local study done by Yusoff et al. (2018) reported that the mean height of 95 university students of UniSZA was 1.61 ± 0.08 m, in which male students were taller (1.71 ± 0.01 m) than female students (1.57 ± 0.02 m). Likewise, a previous study done by Gan et al. (2011a) highlighted that males were taller (170.39 ± 6.09 cm) than females (156.92 ± 5.55 cm).

Besides, the average BMI of the respondents in this study was 23.65 ± 5.19 kg/m^2. Male respondents had higher BMI (25.20 ± 6.18 kg/m^2) than female respondents (23.17 ± 4.76 kg/m^2). Similarly, a recent local cross-sectional study conducted by Chin et al. (2020) found that the mean BMI of university students was 21.8 ± 3.7 kg/m^2, in which male university students (22.8 ± 3.9 kg/m^2) showed higher BMI than female students (21.4 ± 3.6 kg/m^2). A cross-sectional study in India conducted by Khan, Khan, Kochhar, Singh, Goyal, and Sharma (2018) among 210

undergraduate medical students in Medical College of Haryana found that the mean BMI was 22.5 ± 3.6 kg/m^2, in which the mean BMI of male students was higher (23.7 ± 3.6 kg/m^2) than female students (21.8 ± 3.5 kg/m^2). In Canada, a study done by Frehlich, Eller, Parnell, Fung, and Reimer (2017) among 124 undergraduate students enrolled in an introductory nutrition course from University of Calgary and Mount Royal University found that the mean BMI was 22.7 ± 3.0 kg/m^2, with mean BMI for males was 23.7 ± 3.1 kg/m^2 and 22.4 ± 2.8 kg/m^2 for females. In contrast, a cross-sectional study done by Victor, Rauf and Samuel Aleyira (2014) among 646 university students in Tamale, Ghana reported that the mean BMI was 21.79 ± 3.10 kg/m^2, in which females had higher mean BMI (22.84 ± 4.15 kg/m^2) than males (21.32 ± 2.33 kg/m^2).

The present study further showed that 12.0% of the respondents were underweight, 19.1% were overweight and 11.6% were obese. A recent local study done by Chin et al. (2020) reported the prevalence of underweight, overweight and obesity among university students in Selangor were 14.4%, 11.3% and 4.3%, respectively. A study done by Yadav, Saini, Khan, Bachloo, Kumar, and Singh (2016) on 130 undergraduate medical students in Haryana, India found that 1.5% were underweight, 22.3% were overweight and 3.1% were obese. Another study conducted among 1328 university students aged 19–23 years in southern Anhui region, China found that 18.75% were underweight, 6.85% were overweight and 2.26% were obese (Wang, Chen, Jin, Zhu & Yao, 2019). Şanlier, Türközü and Toka (2016) found that the prevalence of underweight among 793 university students in Ankara, Turkey was 12.7% and 9.7% reported overweight and obese. In United Arab Emirates, Radwan et al. (2019) reported that 4.5% students from University of Sharjah were underweight and 39.5% were overweight and obese. In Bangladesh, Mahmuda et al. (2019) found

that 21.78% of the university students were underweight, 9.19% were overweight and 1.84% were obese. In Tamale, Ghana, Victor et al. (2014) found that 5.5% university students aged 18-24 years old were underweight, 10.0% overweight and 1.8% were obese.

More female respondents in the current study were found to be underweight (13.6%) compared to male respondents (7.0%). However, more male respondents were overweight (26.3%) and obese (15.9%) compared to female respondents (overweight = 16.8%, obese = 10.3%). The results in the current study showed similar pattern with a local study done by Gan and Yeoh (2017), in which more females (14.9%) were underweight compared to males (8.5%) and more males were overweight (15.5%) and obese (2.8%) than females (overweight = 9.2%, obese = 1.9%). Another study in India also supported these findings (Yadav et al., 2016). Yadav et al. (2016) reported that higher percentages of male students were overweight (27.2%) and obese (4.9%) compared to female students (overweight = 14.3%, obese = 0.0%), whereas, more female students were underweight (4.1%) compared to male students (0.0%). Victor et al. (2014) also found that more females (6.0%) were underweight than males (4.5%).

However, Victor et al. (2014) reported opposite findings, in which more females were overweight (20.9%) and obese (4.5%) as compared to males (overweight = 4.0%, obese = 0.7%) in Ghana. Another study done by Intiful, Oddam, Kretchy, and Quampah (2019) among 400 undergraduate students at the University of Ghana also found more females were overweight and obese (21.9%) than males (10.9%) and more males (12.7%) were underweight than females (10.1%). Despite inconsistent findings of previous studies, this study highlighted that underweight and overweight and obesity are the problems faced by university students, in which urgent attention is needed.

Furthermore, the average waist circumference of the respondents in this study was 73.85 ± 11.90 cm. Male respondents reported to have higher waist circumference (82.16 ± 13.91 cm) compared to female respondents (71.24 ± 9.88 cm). One in five of the respondents (19.6%) had abdominal obesity, with 20.0% in males and 19.4% in females. Findings of the present study were consistent with a local study done by Gan et al. (2011a), which found that males had higher waist circumference (77.50 ± 9.55 cm) compared to females (70.35 ± 8.32 cm).

Similarly, a study done by Hertelyova, Salaj, Chmelarova, Dombrovsky, Dvorakova, and Kruzliak (2015) among 419 Slovakian university students found that mean waist circumference was 77.70 ± 11.59 cm, where mean waist circumference of males (85.32 ± 10.81 cm) were higher than females (74.00 ± 10.05 cm). Another study conducted by Chen, Pensuksan, Lohsoonthorn, Lertmaharit, Gelaye, and Williams (2014) found lower percentage (12.3%) of abdominal obesity among 2911 university students in Thailand compared to current study and the mean waist circumference was 73.2 ± 9.4 cm. Another local study by Gan and Yeoh (2017) found that 17.4% of the undergraduate students had abdominal obesity. However, Gan and Yeoh (2017) reported that more females (20.2%) had abdominal obesity than males (7.0%), which was contradicted with the findings of the current study.

The mean body fat percentage in this study was 28.39 ± 7.98%, where female respondents had higher body fat percentage (30.23 ± 7.20%) compared to male respondents (22.77 ± 7.69%). However, a lower percentage of body fat (21.00 ± 6.20%) was reported in Japan (males = 19.1 ± 5.6%, females = 25.6 ± 5.2%) (Maruyama et al., 2017) as compared to the current study. Nearly two in five of the respondents (39.7%) had unhealthy body fat percentage (males = 39.6%, females = 39.7%) in this study.

Previous local studies reported the mean ± SD of the body fat percentage among university students was 27.5 ± 6.9% in Sarawak (Cheah, Majorie, Helmy, & Chang, 2018) and 25.1 ± 6.9% in Terengganu (Yusoff et al., 2018). Another local study done by Gan and Yeoh (2017) that adopted similar body fat classification with the present study found that the mean body fat percentage of university students in Selangor was 27.40 ± 7.29%, in which females had higher body fat percentage (28.95 ± 4.96%) than males (21.63 ± 10.84%). Their findings also showed that more females (30.5%) were in unhealthy range of body fat percentage compared to males (26.8%).

Similarly, a study conducted by Zaccagni, Barbieri and Gualdi-Russo (2014) among Italian university students found that body fat percentage was higher in females compared to males. Females' body composition had the ability to store fat more than males and basal fat oxidation was lower in females as compared to males (Blaak, 2001). Additionally, females had lower ability to burn energy after eating due to females' sex hormone of oestrogen (Karastergiou, Smith, Greenberg, & Fried, 2012).

4.2 Mindful Eating

Table 4.3 shows the distribution of respondents by items in the Mindful Eating Questionnaire (MEQ). Results showed that almost one third (31.5%) of the respondents answered "never or rarely" for the statement "*I notice when just going into a movie theater makes me want to eat candy or popcorn*". More than one in four of the respondents (27.2%) often noticed that they ate a dish of candy just because it was there. One third of the respondents (33.3%) reported that they "never or rarely" had trouble not eating ice cream, cookies, or chips if they were around the house. Almost half of the respondents (49.6%) "never or rarely" ate quickly and did not taste what they ate and 27.5% often had thoughts tend to wander while they were eating.

Table 4.3 : Distribution of respondents according to response to each item related to mindful eating (*n*=276)

	Items	n (%)				
		Not Applicable	Never/ rarely	Sometime	Often	Usually/ always
Disinhibition						
2	When I eat at "all you can eat" buffets, I tend to overeat.	8 (2.9)	52 (18.8)	120 (43.5)	56 (20.3)	40 (14.5)
5	When a restaurant portion is too large, I stop eating when I'm full.	-	43 (15.6)	99 (35.9)	81 (29.3)	53 (19.2)
7	When I'm eating one of my favorite foods, I don't recognize when I've had enough.	-	34 (12.3)	100 (36.2)	100 (36.2)	42 (15.2)
9	If it doesn't cost much more, I get the larger size food or drink regardless of how hungry I feel.	-	44 (15.9)	98 (35.5)	71 (25.7)	63 (22.8)
11	If there are leftovers that I like, I take a second helping even though I'm full.	-	59 (21.4)	113 (40.9)	69 (25.0)	35 (12.7)
15	I stop eating when I'm full even when eating something I love.	-	22 (8.0)	97 (35.1)	103 (37.3)	54 (19.6)
18	If there's good food at a party, I'll continue eating even after I'm full.	-	59 (21.4)	130 (47.1)	68 (24.6)	19 (6.9)
25	When I'm at a restaurant, I can tell when the portion I've been served is too large for me.	-	22 (8.0)	74 (26.8)	104 (37.7)	76 (27.5)
	Mean ± SD	2.65 ± 0.51				
	Min – Max	1.25 – 3.88				
Awareness						
10	I notice when there are subtle flavors in the foods I eat.	-	24 (8.7)	124 (44.9)	88 (31.9)	40 (14.5)
12	When eating a pleasant meal, I notice if it makes me feel relaxed	-	11 (4.0)	61 (22.1)	111 (40.2)	93 (33.7)
16	I appreciate the way my food looks on my plate.	-	16 (5.8)	60 (21.7)	106 (38.4)	94 (34.1)
20	I notice when foods and drinks are too sweet.	-	6 (2.2)	49 (17.8)	90 (32.6)	131 (47.5)
21	Before I eat I take a moment to appreciate the colors and smells of my food.	-	50 (18.1)	109 (39.5)	95 (34.4)	22 (8.0)
22	I taste every bite of food that I eat.	-	12 (4.3)	106 (38.4)	106 (38.4)	52 (18.8)

Table 4.3 : Distribution of respondents according to response to each item related to mindful eating (*n*=276) *(cont.)*

	Items	n (%)				
		Not Applicable	Never/ rarely	Sometime	Often	Usually/ always
26	I notice when the food I eat affects my emotional state.	-	41 (14.9)	100 (36.2)	96 (34.8)	39 (14.1)
	Mean ± SD	2.76 ± 0.52				
	Min – Max	1 – 4				
External Cues						
3	At a party where there is a lot of good food, I notice when it makes me want to eat more food than I should.	-	16 (5.8)	105 (38.0)	95 (34.4)	60 (21.7)
4	I recognize when food advertisements make me want to eat.	7 (2.5)	17 (6.2)	123 (44.6)	89 (32.2)	40 (14.5)
8	I notice when just going into a movie theater makes me want to eat candy or popcorn.	11 (4.0)	87 (31.5)	86 (31.2)	52 (18.8)	40 (14.5)
14	When I eat a big meal, I notice if it makes me feel heavy or sluggish.	-	16 (5.8)	68 (24.6)	109 (39.5)	83 (30.1)
23	I recognize when I'm eating and not hungry.	10 (3.6)	28 (10.1)	133 (48.2)	67 (24.3)	38 (13.8)
24	I notice when I'm eating from a dish of candy just because it's there.	-	40 (14.5)	138 (50.0)	75 (27.2)	23 (8.3)
	Mean ± SD	2.52 ± 0.49				
	Min – Max	1 – 4				
Emotional Response						
13	I snack without noticing that I am eating.	-	78 (28.3)	108 (39.1)	62 (22.5)	28 (10.1)
17	When I'm feeling stressed at work, I'll go find something to eat.	22 (8.0)	27 (9.8)	102 (37.0)	80 (29.0)	45 (16.3)
19	When I'm sad, I eat to feel better.	-	46 (16.7)	95 (34.4)	84 (30.4)	51 (18.5)
27	I have trouble not eating ice cream, cookies, or chips if they're around the house.	-	92 (33.3)	96 (34.8)	53 (19.2)	35 (12.7)
	Mean ± SD	2.68 ± 0.67				

Table 4.3 : Distribution of respondents according to response to each item related to mindful eating (*n*=276) *(cont.)*

	Items	n (%)				
		Not Applicable	Never/ rarely	Sometime	Often	Usually/ always
	Min – Max		1 – 4			
Distraction						
1	I eat so quickly that I don't taste what I'm eating.	-	137 (49.6)	110 (39.9)	26 (9.4)	3 (1.1)
6	My thoughts tend to wander while I am eating.	-	37 (13.4)	136 (49.3)	76 (27.5)	27 (9.8)
28	I think about things I need to do while I am eating.	-	16 (5.8)	103 (37.3)	115 (41.7)	42 (15.2)
	Mean ± SD		2.79 ± 0.55			
	Min – Max		1 – 4			
	Mindful eating total score		2.68 ± 0.23			
	Min – Max		1.90 – 3.21			

The mean score of mindful eating in this study was 2.68 ± 0.23. The finding of this study was consistent with a recent local study conducted by Salwani at al. (2019) which reported that the mean score of mindful eating score was 2.68 ± 0.24 among university students. However, findings from southeastern university and northeastern university in the United States reported a slightly higher mean score of mindful eating, which were 2.89 ± 0.32 (Moor et al., 2012) and 2.80 ± 0.30 (Anderson et al., 2015), respectively. Similarly, another cross-sectional study done by Framson et al. (2009) also showed higher mean MEQ score (2.92 ± 0.37) as compared to the present study.

4.3 Behavioural Factors

4.3.1 Physical Activity

Table 4.4 shows the distribution of respondents by items in the Global Physical Activity Questionnaire (GPAQ). Half of the respondents (52.0%) engaged in moderate-intensity activity at work for at least 10 minutes continuously (33.9% male and 57.8% female) and most of them (46.2%) spent 5 days per week to do the activity. The median time spent for the moderate-intensity activity was 25 minutes per day (*IQR*: 12 – 30). More than half of the respondents (54.6%) engaged in moderate-intensity sports, fitness, or recreational activities for at least 10 minutes continuously (51.8% male and 55.5% female). One third of them (31.2%) spent 3 days per week on the activity and the median time spent was 60 minutes per day (*IQR*: 30 – 82.5).

Table 4.4 : Distribution of respondents by items in the Global Physical Activity Questionnaire (*n*=229)

GPAQ items	Median (IQR) / n (%)		
	Male (*n*=56)	**Female (*n*=173)**	**Total (*n*=229)**
Activity at work			
Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate for at least 10 minutes continuously?			
Yes	2 (3.6)	7 (4.0)	9 (3.9)
No	54 (96.4)	166 (96.0)	220 (96.1)
In a typical week, on how many days do you do vigorous-intensity activities as part of your work?			
3		4 (57.1)	4 (44.4)
4		1 (14.3)	1 (11.1)
5	1 (50.0)		1 (11.1)
7	1 (50.0)	2 (28.6)	3 (33.3)
How much time spend on doing vigorous - intensity activities at work on a typical day?	180 (120 – 240)	20 (17.5 – 25)	20 (20 – 120)
Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking for at least 10 minutes continuously?			
Yes	19 (33.9)	100 (57.8)	119 (52.0)
No	37 (66.1)	73 (42.2)	110 (48.0)
In a typical week, on how many days do you do moderate-intensity activities as part of your work?			
1	1 (5.3)	7 (7.0)	8 (6.7)
2	4 (21.1)	14 (14.0)	18 (15.1)
3	2 (10.5)	14 (14.0)	16 (13.4)
4	2 (10.5)	11 (11.0)	13 (10.9)
5	8 (42.1)	47 (47.0)	55 (46.2)
6	1 (5.3)	4 (4.0)	5 (4.2)
7	1 (5.3)	3 (3.0)	4 (3.4)
How much time do you spend doing moderate-intensity activities on a typical day?	25 (12 – 30)	22.5 (12 – 30)	25 (12 – 30)

Table 4.4 : Distribution of respondents by items in the Global Physical Activity Questionnaire (*n*=229) *(cont.)*

GPAQ items	Median (IQR) / n (%)		
	Male (*n*=56)	**Female (*n*=173)**	**Total (*n*=229)**
Travel to and from places			
Do you walk or use bicycle for at least 10 minutes continuously to get to and from places?			
Yes	40 (71.4)	145 (83.8)	185 (80.8)
No	16 (28.6)	28 (16.2)	44 (19.2)
In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?			
1	4 (10.0)	21 (14.5)	25 (13.5)
2	3 (7.5)	12 (8.3)	15 (8.1)
3	2 (5.0)	20 (13.8)	22 (11.9)
4	7 (17.5)	19 (13.1)	26 (14.1)
5	13 (32.5)	35 (24.1)	48 (25.9)
6	4 (10.0)	7 (4.8)	11 (5.9)
7	7 (17.5)	31 (21.4)	38 (20.5)
How much time do you spend walking or bicycling for travel on a typical day?	30 (26.25 – 60)	30 (15 – 60)	30 (15 – 60)
Recreational activity			
Do you do any vigorous-intensity sports, fitness or recreational activities that cause large increases in breathing or heart rate like for at least 10 minutes continuously?			
Yes	29 (51.8)	41 (23.7)	70 (30.6)
No	27 (48.2)	132 (76.3)	159 (69.4)
In a typical week, on how many days spend on vigorous-intensity sports, fitness or recreational activities on a typical week?			
1	5 (17.2)	7 (17.1)	12 (17.1)
2	6 (20.7)	14 (34.1)	20 (28.6)
3	7 (24.1)	8 (19.5)	15 (21.4)
5	6 (20.7)	3 (7.3)	9 (12.9)
6	1 (3.4)	7 (17.1)	8 (11.4)
7	4 (13.8)	2 (4.9)	6 (8.6)
How much time spend on vigorous-intensity sports, fitness or recreational activities on a typical day?	60 (30 – 90)	60 (30 – 105)	60 (30 – 90)

Table 4.4 : Distribution of respondents by items in the Global Physical Activity Questionnaire (*n*=229) *(cont.)*

GPAQ items	Median (IQR) / n (%)		
	Male (*n*=56)	**Female (*n*=173)**	**Total (*n*=229)**
How much time spend on moderate-intensity sports, fitness or recreational activities on a typical day?	45 (30 – 67.5)	60 (30 – 90)	60 (30 – 82.5)
Sedentary behaviour			
How much time do you usually spend sitting or reclining on a typical day?	555 (480 – 780)	600 (480 – 750)	600 (480 – 765)

As shown in Table 4.5, the median score of physical activity of the respondents was 1240 MET-min/week (*IQR*: 600 – 2520), in which males had higher median 1320 MET-min/week (*IQR*: 720 – 3780) compared to female 1240 MET-min/week (*IQR*: 600 – 2380). In this study, 21.4% of the respondents reported to have high physical activity level, 55.9% had moderate physical activity level, and 22.7% had low physical activity level.

Similarly, a local study done by Goje et al. (2014) found that more than half (58.3%) of the undergraduate students had moderate level of physical activity. However, higher percentage of low physical activity level (41.4%) and lower percentage of high physical activity level (0.3%) were reported (Goje et al., 2014). Another local study done by Tahereh, Rosita and Hazizi (2015) reported that one third of the university students in Malaysia engaged in low (32.2%), moderate (34.7%) and high (33.1%) levels of physical activity.

A study done by Muhammad Zubair et al. (2019) among medical students at Rawalpindi Medical University, Pakistan reported that 16.4% had high physical activity level, 43.4% had moderate physical activity level and 40.2% had low physical activity level. Victor et al. (2014) reported that almost half of students (48.8%) in

Tamale, Ghana engaged in moderate physical activity level, 36.5% had high physical activity level and 14.7% had low level of physical activity.

Table 4.5 : Distribution of physical activity level of the respondents by sex

Variables	Median (IQR) / n (%)		
	Male (*n*=56)	**Female (*n*=173)**	**Total (*n*=229)**
Physical activity (MET-min/week)	1320 (720 – 3780)	1240 (600 – 2380)	1240 (600 – 2520)
Low	10 (17.9)	42 (24.3)	52 (22.7)
Moderate	27 (48.2)	101 (58.4)	128 (55.9)
High	19 (33.9)	30 (17.3)	49 (21.4)

4.3.2 Eating Behaviours

Table 4.6 shows the distribution of the respondents by items in the Three-Factors Eating Questionnaire Revised (TFEQ-R18). Almost half of the respondents (49.6%) seldom avoid "stocking up" on tempting foods and 54.0% reported slightly likely to consciously eat less than they want. Half of the respondents (53.3%) answered "mostly true" in the item "*When I smell a delicious food, I find it very difficult to keep from eating, even if I have just finished a meal*". Similarly, 53.6% of the respondents reported that they sometimes felt hungry between meals, while 27.9% reported that they only felt hungry during mealtimes.

Table 4.6 : Distribution of the respondents by items in the Three Factors Eating Questionnaire Revised (*n*=276)

	TFEQR-18 items	n (%)			
		Definitely false	**Mostly false**	**Mostly true**	**Definitely true**
Cognitive Restraint					
2	I deliberately take small helpings as a means of controlling my weight.	26 (9.4)	88 (31.9)	144 (52.2)	18 (6.5)
11	I consciously hold back at meals in order not to weight gain.	34 (12.3)	99 (35.9)	109 (39.5)	34 (12.3)
12	I do not eat some foods because they make me fat.	54 (19.6)	93 (33.7)	92 (33.3)	37 (13.4)
15	How frequently do you avoid "stocking up" on tempting foods?	Almost never 21 (7.6)	Seldom 137 (49.6)	Moderately likely 97 (35.1)	Almost always 21 (7.6)
16	How likely are you to consciously eat less than you want?	Unlikely 28 (10.1)	Slightly likely 149 (54.0)	Moderately likely 76 (27.5)	Very likely 23 (8.3)
18	On a scale of 1 to 8, where 1 means no restraint in eating (eating whatever you want, whenever you want it) and 8 means total restraint (constantly limiting food intake and never "giving in"), what number would you give yourself? (*n*=273)			1 2 3 4 5 6 7 8	17 (6.2) 18 (6.6) 32 (11.7) 58 (21.2) 86 (31.5) 52 (19.0) 9 (3.3) 1 (0.4)
	Mean ± SD Min – Max	16.66 ± 3.44 6 – 27			

Table 4.6 : Distribution of the respondents by items in the Three Factors Eating Questionnaire Revised (*n*=276) *(cont.)*

	TFEQR-18 items	n (%)			
		Definitely false	**Mostly false**	**Mostly true**	**Definitely true**
Uncontrolled Eating					
1	When I smell a delicious food, I find it very difficult to keep from eating, even if I have just finished a meal.	23 (8.3)	80 (29.0)	147 (53.3)	26 (9.4)
4	Sometimes when I start eating, I just can't seem to stop.	51 (18.5)	117 (42.4)	88 (31.9)	20 (7.2)
5	Being with someone who is eating often makes me hungry enough to eat also.	25 (9.1)	82 (29.7)	131 (47.5)	38 (13.8)
7	When I see a real delicacy, I often get so hungry that I have to eat right away.	23 (8.3)	93 (33.7)	132 (47.8)	28 (10.1)
8	I get so hungry that my stomach often seems like a bottomless pit.	29 (10.5)	114 (41.3)	108 (39.1)	25 (9.1)
9	I am always hungry so it is hard for me to stop eating before I finish the food on my plate.	49 (17.8)	108 (39.1)	94 (34.1)	25 (9.1)
13	I am always hungry enough to eat at any time.	31 (11.2)	120 (43.5)	103 (37.3)	22 (8.0)
14	How often do you feel hungry?	Only at mealtimes	Sometimes between meals	Often between meals	Almost always
		77 (27.9)	148 (53.6)	38 (13.8)	13 (4.7)
17	Do you go on eating binges though you are not hungry?	Never	Rarely	Sometimes	At least once a week
		25 (9.1)	122 (44.2)	120 (43.5)	9 (3.3)
	Mean ± SD	21.77 ± 4.22			
	Min – Max	9 – 34			

Table 4.6 : Distribution of the respondents by items in the Three Factors Eating Questionnaire Revised (*n*=276) *(cont.)*

	TFEQR-18 items	n (%)			
		Definitely false	Mostly false	Mostly true	Definitely true
Emotional Eating					
3	When I feel anxious, I find myself eating.	41 (14.9)	103 (37.3)	103 (37.3)	29 (10.5)
6	When I feel blue, I often overeat.	45 (16.3)	112 (40.6)	93 (33.7)	26 (9.4)
10	When I feel lonely, I console myself by eating.	49 (17.8)	86 (31.2)	107 (38.8)	34 (12.3)
	Mean ± SD	7.25 ± 2.18			
	Min – Max	3 – 12			

Table 4.7 shows the distribution of dysfunctional eating subscales by sex. The average cognitive restraint subscale of the respondents was 16.66 ± 3.44, uncontrolled eating subscale was 21.77 ± 4.22 and emotional eating subscale was 7.25 ± 2.18. The findings of this study were consistent with a local study done by Dickson, Tharshini, Dhivya, and Abd Rauf Fahmi (2019). Dickson et al. (2019) conducted a study on 155 fourth year medical students in Melaka Manipal Medical College (MMMC) in Muar reported that the mean total cognitive restraint score was 14.08 ± 3.39, mean total uncontrolled eating score was 21.82 ± 5.40 and mean total emotional eating score was 7.16 ± 2.57.

Male respondents (22.27 ± 4.50) scored higher in the uncontrolled eating subscale compared to females (21.60 ± 4.11) in this study. Females had higher mean for cognitive restraint (16.82 ± 3.48) and emotional eating (7.28 ± 2.17) subscale sores compared to males (cognitive restraint = 16.20 ± 3.31, emotional eating = 7.17 ± 2.24) in this study. A recent study conducted by Intiful et al. (2019) among 400 undergraduate students of the University of Ghana reported that more females had cognitive restraint (30.0%) and emotional eating (24.7%) in comparison to males (cognitive restraint = 21.7%, emotional eating = 15.7%).

Table 4.7 : Distribution of TFEQR-18 subscale by sex

Subscale of TFEQR-18	Mean ± SD		
	Male (n=71)	Female (n=205)	Total (n=276)
Cognitive restraint	16.20 ± 3.31	16.82 ± 3.48	16.66 ± 3.44
Uncontrolled eating	22.27 ± 4.50	21.60 ± 4.11	21.77 ± 4.22
Emotional eating	7.17 ± 2.24	7.28 ± 2.17	7.25 ± 2.18

Table 4.8 shows that more than one third (36.6%) of the respondents did not drink or eat 100% fruit juices such as orange juice, apple juice, or grape juice during the past 7 days and two in five of them (40.6%) consumed fruits 1 to 3 times during the past 7 days. One fifth of the respondents did not eat fish (21.4%), 9.1% did not eat vegetable and 34.1% did not eat legumes. The results also showed that 39.9% of the respondents did not drink soft drink, 55.8% did not drink sport drink and 24.6% did not drink milk in the past 7 days.

Similarly, a study done by Gan et al. (2011a) found 30.1% local university students did not drink or eat 100% fruit juices such as orange juice, apple juice, or grape juice during the past 7 days. A study conducted by Intiful et al. (2019) among 400 undergraduate students at the University of Ghana found that 58.2% of the students consumed fruits and vegetables. According to Gan et al. (2011a), more than half of the university students commonly consumed vegetables, bread/rice/noodles, and meat/poultry at least one time daily. Pérusse-Lachance, Tremblay and Drapeau (2010) reported that most Canadian university students (39.9%) did not consume recommended amount of fish weekly (females=61%, males=57%). Pérusse-Lachance et al. (2010) found that 16.1% and 4.3% of students regularly consumed (≥1 time/week) soft and energy drinks respectively. In Spain, Moreno-Gómez et al. (2012) also reported that university students had low intake of legumes per week than recommended amount which was 2–4 servings/week.

Table 4.8 : Distribution of the respondents by items in the Youth Risk Behaviour Survey (*n*=276)

	During the past 7 days, how many times did you drink/eat …	n (%)						
		I did not drink/eat this food during the past 7 days	**1 to 3 times during the past 7 days**	**4 to 6 times during the past 7 days**	**1 time / glass per day**	**2-time / glasses per day**	**3-time / glasses per day**	**4 or more times / glasses per day**
1	100% fruit juices such as orange juice, apple juice, or grape juice	101 (36.6)	110 (39.9)	32 (11.6)	11 (4.0)	10 (3.6)	9 (3.3)	3 (1.1)
2	Fruit	37 (13.4)	112 (40.6)	69 (25.0)	25 (9.1)	16 (5.8)	12 (4.3)	5 (1.8)
3	Bread, rice, mi, or mihun	15 (5.4)	31 (11.2)	73 (26.4)	32 (11.6)	68 (24.6)	24 (8.7)	33 (12.0)
4	Meat or chicken	10 (3.6)	36 (13.0)	85 (30.8)	34 (12.3)	52 (18.8)	31 (11.2)	28 (10.1)
5	Fish	59 (21.4)	72 (26.1)	55 (19.9)	29 (10.5)	35 (12.7)	17 (6.2)	9 (3.3)
6	Vegetable	25 (9.1)	65 (23.6)	63 (22.8)	33 (12.0)	45 (16.3)	30 (10.9)	15 (5.4)
7	Legumes (e.g. lentils, peanuts, peas, beans)	94 (34.1)	86 (31.2)	37 (13.4)	25 (9.1)	18 (6.5)	8 (2.9)	8 (2.9)
8	A can, bottle, or glass of soft drink, such as Coke, Pepsi, or Sprite	110 (39.9)	81 (29.3)	41 (14.9)	14 (5.1)	16 (5.8)	11 (4.0)	3 (1.1)
9	A can, bottle, or glass of a sports drink such as Red Bull, 100Plus Isotonic Drink, Revive, Power Root, Isomax or Livita	154 (55.8)	43 (15.6)	41 (14.9)	18 (6.5)	11 (4.0)	6 (2.2)	3 (1.1)
10	A bottle or glass of plain water (Count tap, bottled, and unflavored sparkling water.)	26 (9.4)	18 (6.5)	34 (12.3)	15 (5.4)	16 (5.8)	29 (10.5)	138 (50.0)
11	Milk	68 (24.6)	68 (24.6)	48 (17.4)	33 (12.0)	37 (13.4)	16 (5.8)	6 (2.2)

4.4 Psychological Factors

4.4.1 Depression, Anxiety, Stress

As shown in Table 4.9, the mean total score of depression was 6.11 ± 4.64, with a minimum score of 0 and a maximum score of 21. Half of the respondents (52.9%) never felt that life was meaningless, 50% sometimes found it difficult to work up the initiative to do things, and 21.4% often felt that they had nothing to look forward. The mean total anxiety subscale was 7.41 ± 4.17, with a minimum score of 0 and a maximum score of 18. The results reported that 41.7% of the respondents sometimes experienced breathing difficulty and almost one third (31.9%) of the respondents often aware of dryness of their mouth. The mean of stress subscale was 6.97 ± 4.37, with a minimum score of 0 and a maximum score of 18. The results reported that almost half (47.1%) of the respondents sometimes found it hard to wind down and 41.3% of the respondents felt that they were rather touchy.

Table 4.10 shows the distribution of depression, anxiety and stress severity by sex. The mean total score of depression was higher in males (6.72 ± 4.64) compared to females (5.90 ± 4.63). Nearly one in four of the respondents (23.2%) reported to have moderate depression severity (male 23.9%, female 22.9%). The results further showed that 8.7% had severe depression and 11.2% had extremely severe depression, in which more males had severe (11.3%) and extremely severe (14.1%) depression as compared to females (severe = 7.8%, extremely severe = 10.2%). Similarly, a recent study done by Gan et al. (2019) reported the mean depression score among public university students in Malaysia was 6.28 ± 4.6 (moderate = 22.6%, severe = 7.8%, extremely severe = 10.4%). Another local study done by Teh et al. (2015) reported that the mean depression score was 9.8 ± 7.9 among undergraduate students in Melaka

Table 4.9 : Distribution of the respondents by items in the Depression, Anxiety and Stress Scale (*n*=276)

	DASS-21 items	n (%)			
		Never	Sometimes	Often	Almost always
Depression					
3	I couldn't seem to experience any positive feeling at all	96 (34.8)	128 (46.4)	46 (16.7)	6 (2.2)
5	I found it difficult to work up the initiative to do things	55 (19.9)	138 (50.0)	61 (22.1)	22 (8.0)
10	I felt that I had nothing to look forward to	121 (43.8)	87 (31.5)	59 (21.4)	9 (3.3)
13	I felt downhearted and blue	97 (35.1)	116 (42.0)	51 (18.5)	12 (4.3)
16	I was unable to become enthusiastic about anything	120 (43.5)	100 (36.2)	49 (17.8)	7 (2.5)
17	I felt I wasn't worth much as a person	125 (45.3)	88 (31.9)	55 (19.9)	8 (2.9)
21	I felt that life was meaningless	146 (52.9)	73 (26.4)	48 (17.4)	9 (3.3)
	Mean ± SD	6.11 ± 4.64			
	Min – Max	0 – 21			
Anxiety					
2	I was aware of dryness of my mouth	30 (10.9)	98 (35.5)	88 (31.9)	60 (21.7)
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	103 (37.3)	115 (41.7)	51 (18.5)	7 (2.5)
7	I experienced trembling (eg, in the hands)	115 (41.7)	96 (34.8)	48 (17.4)	17 (6.2)
9	I was worried about situations in which I might panic and make a fool of myself	64 (23.2)	102 (37.0)	86 (31.2)	24 (8.7)
15	I felt I was close to panic	122 (44.2)	100 (36.2)	41 (14.9)	13 (4.7)
19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	74 (26.8)	106 (38.4)	79 (28.6)	17 (6.2)
20	I felt scared without any good reason	120 (43.5)	98 (35.5)	44 (15.9)	14 (5.1)
	Mean ± SD	7.41 ± 4.17			
	Min – Max	0 – 18			

Table 4.9 : Distribution of the respondents by items in the Depression, Anxiety and Stress Scale (*n*=276) *(cont.)*

	DASS-21 items	n (%)			
		Never	Sometimes	Often	Almost always
Stress					
1	I found it hard to wind down	71 (25.7)	130 (47.1)	68 (24.6)	7 (2.5)
6	I tended to over-react to situations	78 (28.3)	112 (40.6)	67 (24.3)	19 (6.9)
8	I felt that I was using a lot of nervous energy	85 (30.8)	107 (38.8)	66 (23.9)	18 (6.5)
11	I found myself getting agitated	105 (38.0)	109 (39.5)	54 (19.6)	8 (2.9)
12	I found it difficult to relax	108 (39.1)	110 (39.9)	45 (16.3)	13 (4.7)
14	I was intolerant of anything that kept me from getting on with what I was doing	96 (34.8)	107 (38.8)	62 (22.5)	11 (4.0)
18	I felt that I was rather touchy	82 (29.7)	114 (41.3)	57 (20.7)	23 (8.3)
	Mean ± SD	6.97 ± 4.37			
	Min – Max	0 – 18			

Table 4.10 : Distribution of depression, anxiety and stress severity of the respondents by sex

DASS-21	Mean ± SD / n (%)		
	Male (*n*=71)	Female (*n*=205)	Total (*n*=276)
Depression	6.72 ± 4.64	5.90 ± 4.63	6.11 ± 4.64
Normal	28 (39.4)	93 (45.4)	121 (43.8)
Mild	8 (11.3)	28 (13.7)	36 (13.0)
Moderate	17 (23.9)	47 (22.9)	64 (23.2)
Severe	8 (11.3)	16 (7.8)	24 (8.7)
Extremely severe	10 (14.1)	21 (10.2)	31 (11.2)
Anxiety	7.55 ± 4.52	7.36 ± 4.05	7.41 ± 4.17
Normal	15 (21.1)	36 (17.6)	51 (18.5)
Mild	10 (14.1)	33 (16.1)	43 (15.6)
Moderate	11 (15.5)	50 (24.4)	61 (22.1)
Severe	10 (14.1)	26 (12.7)	36 (13.0)
Extremely severe	25 (35.2)	60 (29.3)	85 (30.8)
Stress	7.14 ± 4.57	6.91 ± 4.31	6.97 ± 4.37
Normal	39 (54.9)	124 (60.5)	163 (59.1)
Mild	11 (15.5)	26 (12.7)	37 (13.4)
Moderate	9 (12.7)	28 (13.7)	37 (13.4)
Severe	12 (16.9)	22 (10.7)	34 (12.3)
Extremely severe	0	5 (2.4)	5 (1.8)

Manipal Medical College, in which 20.9% had moderate, 6.3% had severe and 3.5% had extremely severe depression.

The mean total score of anxiety was higher in males (7.55 ± 4.52) compared to females (7.36 ± 4.05). One fifth of the respondents (22.1%) reported to have moderately severe anxiety (male 15.5%, female 24.4%) and 30.8% reported to have extremely severe anxiety (male 35.2%, female 29.3%). Similarly, a recent local study done by Gan et al. (2019) reported that the mean anxiety score among public university students in Malaysia was 7.49 ± 4.17, with 21.1% in moderate severity. However, the distribution of severe (5.6%) and extremely severe (1.1%) was lower than the current study.

Another local study done by Teh et al. (2015) reported that the mean anxiety score was 11.0 ± 7.7, in which 30.5% had moderate, 10.1% had severe and 14.9% had

extremely severe anxiety levels. Another study done by Noorlila et al. (2018) on 390 undergraduate students from UPM found that the distribution of anxiety severity was 15.9% moderate, 24.1% severe and 40.5% extremely severe.

According to Noorlila et al. (2018), high anxiety among university students reflected the emotional states on how they performed their daily students' lives with high-demand activities such as studying, attending the class, sitting for examination, doing assignment and projects and financial constriction. Another reason for the high percentage of severe and extremely severe anxiety (43.8%) in the current study might be due to the implementation of MCO by Malaysian government as this study found a significant higher anxiety score (p<0.05) during implementation of MCO as compared to before MCO (result not shown). The closure of university and the abrupt shift towards online learning might increase the anxiety level of students, especially those who had to stay on campus due to lockdown.

The mean total score of stress was higher in male respondents (7.14 ± 4.57) compared to female respondents (6.91 ± 4.31) in this study. A total of 14.1% of the respondents had severe (12.3%) and extremely severe (1.8%) stress levels, in which more males (16.9%) were in severe stress level (female = 10.7%) and more females (2.4%) were in extremely severe stress level (male 0.0%).

Similar to the findings of the current study, Ranita et al. (2019) reported that 3.3% of the undergraduate students in Kolej Universiti Islam Antarabangsa Selangor had severe stress level and none had extremely severe stress level (normal = 65.9%, mild = 19.8%, moderate = 11.0%). Likewise, Teh et al. (2015) reported that the mean stress score of students was 12.7 ± 12.8 (moderate = 10.8%, severe = 5.0%, extremely severe = 0.8%). Besides, a study done by Gan et al. (2019) reported that the mean stress score among public university students was 7.57 ± 4.06 (moderate = 12.6%,

severe = 10.7%, extremely severe = 2.6%). These findings indicated that university authorities need to pay special attention to psychologically unhealthy students.

4.4.2 Body Appreciation

Table 4.11 shows the distribution of the respondents by items in the Body Appreciation Scale (BAS-2). The results reported that 42.8% of the respondents always respect their body. One third of the respondents often felt their body had at least some good qualities (33.3%) and often appreciated the different and unique characteristic of their body (33.0%). The mean total score of body appreciation in this study was 3.71 ± 0.94, with a minimum score of 1 and a maximum score of 5.

Table 4.11: Distribution of the respondents by items in the Body Appreciation Scale (*n*=276)

	BAS items	n (%)				
		Never	Seldom	Some-times	Often	Always
1	I respect my body	10 (3.6)	16 (5.8)	51 (18.5)	81 (29.3)	118 (42.8)
2	I feel good about my body	11 (4.0)	34 (12.3)	90 (32.6)	79 (28.6)	62 (22.5)
3	I feel that my body has at least some good qualities	11 (4.0)	23 (8.3)	80 (29.0)	92 (33.3)	70 (25.4)
4	I take a positive attitude towards my body	6 (2.2)	26 (9.4)	72 (26.1)	89 (32.2)	83 (30.1)
5	I am attentive to my body's needs	7 (2.5)	27 (9.8)	73 (26.4)	105 (38.0)	64 (23.2)
6	I feel love for my body	9 (3.3)	27 (9.8)	73 (26.4)	87 (31.5)	80 (29.0)
7	I appreciate the different and unique characteristics of my body	8 (2.9)	23 (8.3)	80 (29.0)	91 (33.0)	74 (26.8)
8	My behavior reveals my positive attitude toward my body; for example, I hold my head high and smile	7 (2.5)	28 (10.1)	73 (26.4)	90 (32.6)	78 (28.3)
9	I am comfortable in my body	14 (5.1)	29 (10.5)	70 (25.4)	89 (32.2)	74 (26.8)
10	I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/actors)	18 (6.5)	34 (12.3)	80 (29.0)	67 (24.3)	77 (27.9)
	Mean ± SD	3.71 ± 0.94				
	Min – Max	1 – 5				

As shown in Table 4.12, the mean body appreciation score was higher in male respondents (3.78 ± 0.94) compared to female respondents (3.69 ± 0.94). The finding of this study was consistent with a study done by Tylka and Wood-Barcalow (2015) among 675 students from The Ohio State University, in which they reported that the mean BAS-2 total score was higher in males compared to females. Female university students had low body appreciation when viewing images of thin female model (Halliwell, 2013), in which female students were found to have higher body size dissatisfaction when compared to male students (Chin et al., 2020). However, according to Quittkat, Hartmann, Dusing, Buhlmann and Vocks (2019), body appreciation differs between gender across older age as men are possibly more affected by restrictions of their body's functionality due to aging processes, whereas women may cherish their body and the remaining functionality when age increases.

Table 4.12 : Body appreciation of the respondents by sex

Variables	Mean ± SD		
	Male (*n*=71)	**Female (*n*=205)**	**Total (*n*=276)**
Body appreciation	3.78 ± 0.94	3.69 ± 0.94	3.71 ± 0.94

4.4.3 Self-compassion

Table 4.13 shows the distribution of the respondents by items in the Self-compassion Scale (SCS). The mean score of self-compassion in this study was 38.22 ± 4.92, ranging from 23 to 56. One in ten of the respondents (9.8%) reported rarely gave themselves the caring and tenderness they needed when they went through hard time. One in five respondents (21.0%) reported they often disapproving and judgmental about their own flaws and inadequacies. One third of the respondents

Table 4.13 : Distribution of the respondents by items in the Self-compassion Scale (*n*=276)

	SCS items	n (%)				
		Never	Rarely	Sometimes	Often	Always
Self-kindness						
2	I try to be understanding and patient towards those aspects of my personality I don't like	3 (1.1)	41 (14.9)	109 (39.5)	100 (36.2)	23 (8.3)
6	When I'm going through a very hard time, I give myself the caring and tenderness I need	7 (2.5)	27 (9.8)	101 (36.6)	97 (35.1)	44 (15.9)
	Mean ± SD	6.88 ± 1.59				
	Min – Max	2 – 10				
Self-judgement						
11	I'm disapproving and judgmental about my own flaws and inadequacies	22 (8.0)	58 (21.0)	120 (43.5)	58 (21.0)	18 (6.5)
12	I'm intolerant and impatient towards those aspects of my personality I don't like	39 (14.1)	62 (22.5)	112 (40.6)	50 (18.1)	13 (4.7)
	Mean ± SD	5.74 ± 1.85				
	Min – Max	2 – 10				
Common Humanity						
5	I try to see my failings as part of the human condition	3 (1.1)	36 (13.0)	102 (37.0)	100 (36.2)	35 (12.7)
10	When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people	7 (2.5)	42 (15.2)	125 (45.3)	80 (29.0)	22 (8.0)
	Mean ± SD	6.71 ± 1.57				
	Min – Max	2 – 10				

Table 4.13 : Distribution of the respondents by items in the Self-compassion Scale (*n*=276) *(cont.)*

	SCS items	n (%)				
		Never	Rarely	Sometimes	Often	Always
Isolation						
4	When I'm feeling down, I tend to feel like most other people are probably happier than I am	9 (3.3)	47 (17.0)	116 (42.0)	69 (25.0)	35 (12.7)
8	When I fail at something that's important to me, I tend to feel alone in my failure	11 (4.0)	58 (21.0)	98 (35.5)	68 (24.6)	41 (14.9)
	Mean ± SD	6.52 ± 1.76				
	Min – Max	2 – 10				
Mindfulness						
3	When something painful happens, I try to take a balanced view of the situation	4 (1.4)	37 (13.4)	103 (37.3)	91 (33.0)	41 (14.9)
7	When something upsets me, I try to keep my emotions in balance	5 (1.8)	36 (13.0)	81 (29.3)	104 (37.7)	50 (18.1)
	Mean ± SD	7.04 ± 1.77				
	Min – Max	2 – 10				
Over-identification						
1	When I fail at something important to me, I become consumed by feelings of inadequacy	11 (4.0)	60 (21.7)	133 (48.2)	52 (18.8)	20 (7.2)
9	When I'm feeling down, I tend to obsess and fixate on everything that's wrong	13 (4.7)	61 (22.1)	110 (39.9)	66 (23.9)	26 (9.4)
	Mean ± SD	6.15 ± 1.64				
	Min – Max	2 – 10				
	Self-compassion total score	38.22 ± 4.92				
	Min – Max	23 – 56				

(36.2%) reported they often tried to see their failings as part of the human condition. When something painful happened or upset them, 13.4% of the respondents reported they rarely trying to take a balanced view of the situation and 13.0% trying to keep their emotions in balance. One in ten respondents (9.4%) reported they always tended to obsess and fixate on everything that was wrong when they were feeling down.

As shown in Table 4.14, the mean self-compassion score in this study was 38.22 ± 4.92, with a minimum score of 23 and a maximum sore of 56. The mean total self-compassion score for female respondents was 38.33 ± 4.97 and for male respondents was 37.89 ± 4.77. Kotera, Green and Van Gordon (2018) reported that the mean self-compassion score of 116 UK caring profession students was 32.84 ± 8.37, ranging from 12 to 60.

Table 4.14 : Self-compassion of the respondents by sex

Variable	Mean ± SD		
	Male (*n*=71)	**Female (*n*=205)**	**Total (*n*=276)**
Self-compassion	37.89 ± 4.77	38.33 ± 4.97	38.22 ± 4.92

4.5 Comparison of Mindful Eating by Different Socio-demographic Status

Independent-samples *t*-tests were performed to compare the differences in mindful eating score with socio-demographic status (sex, age, ethnicity, course of study, year of study and monthly allowance). As shown in Table 4.15, no significant differences were found in mindful eating score with socio-demographic status.

Results showed no significant difference in mindful eating scores between males (2.64 ± 0.22) and females (2.69 ± 0.23; t=-1.692, p=0.092). Finding of the current study was supported by a recent published study done by Köse and Çıplak (2020) in Uludağ University, Turkey which found no statistically significant

Table 4.15 : Differences in mindful eating score with socio-demographic status

Variables	Mindful eating score	*t*	*p*-value
	Mean ± SD		
Sex		-1.692	0.092
Male	2.64 ± 0.22		
Female	2.69 ± 0.23		
Age groups		-0.450	0.653
Younger (19 – 21 years)	2.68 ± 0.22		
Older (22 – 25 years)	2.69 ± 0.24		
Ethnicity		-1.015	0.311
Malay	2.68 ± 0.23		
Non-Malay	2.72 ± 0.24		
Course of study		0.242	0.809
Health Sciences	2.68 ± 0.23		
Non-Health Sciences	2.68 ± 0.21		
Year of study		0.643	0.521
1st and 2nd year	2.69 ± 0.22		
3rd and 4th year	2.67 ± 0.24		
Monthly allowance		-0.498	0.619
<RM500	2.68 ± 0.22		
≥RM500	2.69 ± 0.24		

difference in mindful eating score between males and females. In contrast, a cross-sectional study conducted by Berdal (2012) among 427 students in midwestern university United States found a significant difference in mindful eating score between sexes (p<0.001), in which females showed significantly higher score of mindful eating (M=2.52) compared to males (M=2.40).

This study found no significant difference in mindful eating score between older and younger age groups (t=-0.450, p=0.65). This finding was consistent with Berdal (2012). However, Framson et al. (2009) found that older age group (≥30 years old) had higher mindful eating score as compared to younger age group (2.99 vs 2.79, p<0.01). Inconsistent findings may be attributed to the fact that the ages vary considerably across sample groups as the study by Framson et al. (2009) consisted bulk of respondents aged over 30 years old (70.9%), while most of the respondents in Berdal (2012) studies were under 23 years old (90.9%), in which similar with the

present study (97.4%). Berdal (2012) commented that eating mindfully may become more priority at certain age, particularly after university period. However, Köse and Çıplak (2020) found that as age increased, mindful eating score decreased (p=0.872).

In term of ethnicity, this study found that non-Malay students had slightly higher mindful eating score (2.72 ± 0.24) compared to Malay students (2.68 ± 0.23). However, no significant difference in mindful eating score between Malay and non-Malay ethnic group (t=-1.015, p=0.311) was reported. Only one previous study comparing mindful eating between ethnic groups. Pierson et al. (2016) showed that mindless eating was not significantly difference between Hispanic and non-Hispanic white students, indicating that students showed mindless eating regardless of ethnic groups.

Besides, no significant difference in mindful eating score between respondents enrolled in health sciences program and non-health sciences program (t=0.242, p=0.809). In this study, both course of study reported similar mindful eating score (health sciences = 2.68 ± 0.23, non-health sciences = 2.68 ± 0.21). Berdal (2012) showed that students in health sciences major had higher mindful eating score (M=2.47) compared to those in general education nutrition course (M=2.44). However, consistent with current study, no significant difference was found between general education nutrition course and health science major (Berdal, 2012). Berdal (2012) further analysed the difference on mindful eating subscales and found a significant difference in external cues subscale. Results showed that students in the health science major had higher awareness of external cues subscale (M=3.09) than those in the general education nutrition course (M=2.94), indicating that students in health science major were less likely to eat due to external cues (Berdal, 2012). However, Davis et al. (2014) reported higher mindful eating score in health major / health minor students

(p=0.0105) and in nutrition program (p=0.0078) compared to not-health major/minor, in which the findings were contradicted with the findings of the present study. Davis et al. (2014) stated that university students may need a substantial education in health to develop mindful eating.

There was no significant difference in mindful eating between lower (1st and 2nd year) and higher year of study (3rd and 4th year) (t=0.643, p=0.521). This finding was consistent with a study done by Berdal (2012), in which higher year of study had higher mindful eating score (junior M=2.52, senior M=2.47) than lower year of study (freshman M=2.46, sophomore M=2.44) but no significant difference was found. Furthermore, this study also showed no significant difference in mindful eating score between those with lower (<RM500) and higher (≥RM500) monthly allowance per month (t=-0.498, p=0.619). No previous study has been conducted to compare differences in mindful eating score with monthly allowance.

4.6 Relationships between Body Composition and Mindful Eating

Pearson's product moment correlation test was used to determine the relationship between body composition and mindful eating among undergraduate students in this study. As shown in Table 4.16, this study found that there were inverse relationships between BMI (r=-0.062, p=0.335) and waist circumference (r=-0.094, p=0.156) with mindful eating, whereas positive relationship between body fat percentage (r=0.085, p=0.240) with mindful eating. However, all these relationships were not significantly related. This finding was supported by previous studies (Anderson et al., 2015; Grinnell et al., 2011; Köse & Çıplak, 2020; Taylor et al., 2015). According to Taylor et al. (2015), no significant correlation between BMI and mindful

Table 4.16 : Relationships between body composition and mindful eating

Variables	Mindful eating	
	r	***p*-value**
Body mass index	-0.062	0.335
Waist circumference	-0.094	0.156
Body fat percentage	0.085	0.240

eating among university students might be due to university students face fewer barriers such as time, energy and financial barriers to eat a well-balanced diet as compared to older adults or individuals of a similar average age without a university education. University students are in the rush to meet the deadline for assignments and reports. Researchers added that this relationship between BMI and mindful eating might be significant among older adults because of physiological changes related with aging (Taylor et al., 2015).

In contrast, several previous studies reported significant correlation between BMI and mindful eating among university students (Mantzios et al., 2018a, 2018b; Moor et al., 2012; Pintado-Cucarella & Rodríguez-Salgado, 2016; Salwani et al., 2019; Webb et al., 2018). According to Framson et al. (2009), an inverse relationship between BMI and mindful eating showed that mindful eating can play a significant role in weight maintenance for long-term.

In term of waist circumference, this current study found that waist circumference was not significantly correlated with mindful eating (r=-0.094, p=0.156). There was no study had been conducted to examine this relationship using Mindful Eating Questionniare (MEQ). A study done by Grinnell et al. (2011) adapted Mindful Attention Awareness Scale (MAAS) found that waist circumference was significantly higher in less mindful respondents (p<0.05) compared to more mindful respondents. Besides, finding from this study found that body fat percentage was not significantly correlated with mindful eating (r=0.085, p=0.240). No previous study had

been conducted to examine the relationship between body fat percentage and mindful eating. Overall, the current study found no significant relationship between body composition and mindful eating.

4.7 Relationships between Behavioural Factors and Mindful Eating

Spearman's rho correlation test was performed to determine the relationship between physical activity with mindful eating as MET score of physical activity was not normally distributed. Pearson's product moment correlation test was used to determine the relationship between eating behaviours with mindful eating.

As shown in Table 4.17, there was no relationship between physical activity and mindful eating (r_ρ=-0.093, p=0.160). Finding on the relationship between physical activity and mindful eating in the current study was consistent with a study done by Fred Hutchinson Cancer Research Center (2009). Similarly, Framson et al. (2009) found no or very weak inverse associations of physical activity such as walking and exercise with mindful eating score. Likewise, a study done by Moor et al. (2012) found that minutes of physical activity per week was not related significantly to overall mindful eating score (r=0.17, p=0.05); however, students who were more physically active were less likely to be aware of their food and they were more likely to eat in response to negative emotions. Grinnell et al. (2011) also found no significant relationship between physical activity using IPAQ and mindful eating score.

Table 4.17 : Relationships between behavioural factors and mindful eating

Variables	Mindful eating	
	r	***p*-value**
Physical activity	-0.093	0.160
Eating behaviours		
Cognitive restraint	0.108	0.075
Uncontrolled eating	-0.318**	<0.001
Emotional eating	-0.295**	<0.001

**p<0.01

This study found that cognitive restraint was not significantly correlated with mindful eating (r=0.108, p=0.075). Similarly, a study done by Anderson et al. (2015) among 125 undergraduate students from northeastern university, using TFEQ-51 Restraint subscale, found that restraint subscale was not significantly correlated with mindful eating (r=-0.08, p>0.05). However, the direction of the relationship was contradicted from the current study.

Likewise, Framson et al. (2009) found that cognitive restraint was inversely related with all mindful eating subscales. Framson et al. (2009) emphasized that including mindful eating practices to cognitive weight maintenance strategies such as counting calories and monitoring weight had potential improvement for long term weight maintenance intervention because cognitive restraint was independent from mindful eating construct. According to Kavazidou et al. (2012), cognitive restraint was defined as "*conscious restriction of food intake in order to control body weight or to promote weight loss*". Thus, positive direction in this study indicated that there might be individuals who purposely practised mindful eating to enjoy small quantities or to restrict their food intake in order to lose weight.

On the other hand, this study found that uncontrolled eating was negatively and significantly correlated with mindful eating (r=-0.318, p<0.001). There is lack of study examining this relationship. A cross-sectional study including a sample of 323 Hungarian university students done by Román and Urbán (2019) found significantly relationship (p<0.05) between MEQ subscales with uncontrolled eating measured by TFEQ–R21 (disinhibition r=−0.61, external cues r=0.13, awareness r=0.18, emotional response r=−0.45, distraction r=−0.21).

In addition, an intervention study by Gidugu and Jacobs (2018) among 46 individuals with serious mental illness (SMI) participated over four rounds of the 14-

week to develop healthy eating habits through mindful eating program found positive change in uncontrolled eating as in the expected direction, but the result was not significant (p=0.079). An individual with high uncontrolled eating was prone to loss of self-control in food consumption and had tendency to consume more food than usual (Lim et al., 2020).

Emotional eating was negatively and significantly correlated with mindful eating (r=-0.295, p<0.001) in this study. Similarly, Grinnell et al. (2011) found that mindfulness was negatively correlated with emotional eating (r=-0.26, p<0.01), indicating that respondents with increased mindfulness had lower susceptibility to emotional eating.

4.8 Relationships between Psychological Factors and Mindful Eating

Table 4.18 highlights that depression (r=-0.153, p=0.011) and stress (r=-0.126, p=0.036) were negatively and significantly correlated with mindful eating. On the other hand, body appreciation (r=0.147, p=0.015) and self-compassion (r=0.195, p=0.001) were positively and significantly correlated with mindful eating. However, anxiety (r=-0.024, p=0.694) was not significantly correlated with mindful eating.

Table 4.18 : Relationships between psychological factors and mindful eating

Variables	Mindful eating	
	r	***p*-value**
Depression	-0.153*	0.011
Anxiety	-0.024	0.694
Stress	-0.126*	0.036
Body appreciation	0.147*	0.015
Self-compassion	0.195**	0.001

*p<0.05 **p<0.01

This study found that depression was negatively correlated with mindful eating (r=-0.153, p=0.011). Consistently, a cross-sectional study conducted by Winkens et al. (2018) in three European countries, namely Denmark, Spain and Netherlands also showed that higher levels on three mindful eating domains (focused eating, eating with awareness and eating without distraction) were significantly and negatively associated with a lower level of depressive symptoms and lower risk to have depression. Furthermore, previous studies stated that intervention on mindful eating helps to reduce the tendency to eat in response to low depressive symptom level (Dalen et al., 2010; Kristeller et al., 2014; Pidgeon et al., 2012).

This study found that stress was negatively and significantly correlated with mindful eating (r=-0.126, p=0.036). There is lack of study examining this relationship among undergraduate students. However, a cross-sectional study by Finger et al. (2018) among 243 people with a BMI of at least 25 kg/m^2 and aged from 18 to 60 years old found that those with stress without symptoms ('no symptoms' or 'mild symptoms') had higher mean MEQ total score (2.50 ± 0.358) than stress with symptoms individuals ('moderate symptoms' or 'severe symptoms') (2.37 ± 0.348) with t=2.837, p=0.005. In general, this study emphasized that the more susceptible a person to unhealthy eating, the more stress symptoms he or she has, and thus the greater the tendency to experiential avoidance, cognitive fusion, and lack of contact with the present moment.

In the current study, anxiety was not significantly correlated with mindful eating (r=-0.024, p=0.694). This result was contradicted with a study done by Pintado-Cucarella and Rodríguez-Salgado (2016) among 216 Mexican students which found a significantly negative correlation between mindful eating and anxiety (r=−0.252, p<0.010). The contradict results might be due to the different in study samples, in

which the current study involved university students but the study of Pintado-Cucarella and Rodríguez-Salgado (2016) involved university students who were physically active (sport regularly, university athletes, yoga practitioners). Hulbert-Williams et al. (2013) stated that anxiety can lead to increased appetite and seek for higher calorie foods resulting in a chain reaction, in which the individual was unable to better understand the mood-consumption relationship and subsequently lead to mindless eating.

Furthermore, this study found that body appreciation was positively correlated with mindful eating (r=0.147, p=0.015). Limited study was conducted to determine the relationship between positive body image and mindful eating. A study conducted by Webb et al. (2018) among 333 undergraduate females found that mindful eating was positively correlated with body appreciation (r=0.34, p<0.01). The researchers added that more frequent mindful eating corresponded with higher level of body appreciation.

In this current study, self-compassion was positively correlated with mindful eating (r=0.195, p=0.001). The finding was consistent with a study done by Taylor et al. (2015) among 150 university students in the United States, which found that self-compassion was positively correlated with mindful eating (r=0.34, p<0.01). Similarly, another cross-sectional study done by Mantzios et al. (2018a) among 257 university students in the United Kingdom reported a significant positive relationship between self-compassion and mindful eating (r=0.352, p<0.001). Likewise, a cross-sectional study done by Mantzios et al. (2018b) among 546 undergraduate students in the United Kingdom also demonstrated a moderate and significant positive relationship between self-compassion and mindful eating (r=0.378, p<0.001).

According to Taylor et al. (2015), significant positive correlation between self-compassion and mindful eating might be due to both variables shared components of mindfulness. They added that self-compassion and mindful eating involve consciousness, curiosity and openness to experience, self-reflection and a desire to recognize and appreciate one's self. Those who were self-compassionate might practice in more mindful eating as they viewed mindful eating as an act of self-kindness that they deserved to experience (Taylor et al., 2015). Thus, if an individual had more understanding and forgiving to themselves, the more motivated they were to do anything they should to care for themselves including eating mindfully.

CHAPTER 5

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

5.1 Conclusion

This study showed that mindful eating score among undergraduate students in UPM was 2.68 ± 0.23 out of 4 possible score. Besides, high prevalence of overweight/obesity (30.7%), abdominal obesity (19.6%) and body fat percentage (39.7%) were found. Nearly one in four (22.7%) of the students had low physical activity level. In addition, 19.9%, 43.8%, and 14.1% of undergraduate students had severe/extremely severe depression, anxiety and stress, respectively.

Bivariate results found that low uncontrolled eating, emotional eating, depression, stress, high body appreciation and self-compassion were correlated significantly with mindful eating among undergraduate students. Apart from that, this study found no significant difference in mindful eating score with socio-demographic status. No significant associations were found between BMI, waist circumference, body fat percentage, physical activity, cognitive restraint and anxiety with mindful eating among undergraduate students. Therefore, health promotion program should highlight the importance of preventing uncontrolled eating, emotional eating, depression, stress and enhancing body appreciation and self-compassion among undergraduate students in order to promote mindful eating as one of the healthy eating practices.

5.2 Limitations of the Study

There are several limitations that should be considered in this study. First, this study used a cross-sectional study design. The nature of cross-sectional study design limits the ability to determine cause and effect relationships between body composition, behavioural factors and psychological factors with mindful eating. Therefore, longitudinal studies should be conducted to examine long term effect of mindful eating practice.

Second, this study had low response rate from the respondents due to the enforcement of MCO by Malaysian government from 18th March to 9th June because of COVID-19 outbreak that restricted face to face data collection. Third, this study conducted data collection during assessment weeks (week 3 to week 5) and during MCO, which might contribute to high prevalence of depression, anxiety and stress as reported.

Besides, this study used a set of self-administered questionnaires. This was highly dependent on understanding of the respondents in answering the questions. Therefore, there might be high possibility of under reporting or over reporting from the respondents. Lastly, the sample population in this study only included undergraduate students in UPM. Thus, the findings of this study could not be generalized to all university students in Malaysia.

5.3 Recommendations

There are some recommendations for nutritionists and future studies. First, longitudinal studies should be conducted to examine long term effect of mindful eating practice on university students during their university life. Next, health professionals or nutritionists should include mindfulness approach in developing appropriate

nutrition education programs to promote healthy eating behaviours and healthy weight management among university students. These programs should incorporate the importance of preventing uncontrolled eating, emotional eating, depression, stress and enhancing body appreciation and self-compassion among undergraduate students in order to promote mindful eating as one of the healthy eating practices.

Regular counselling session or e-counselling should be provided in order to improve psychological well-being of university students, which might be one of the determinants in improving eating habits of university students. Besides, future studies should include other factors such as diet quality, nutrient intake and screen time when determining mindful eating. Individuals who practice mindful eating do not necessarily eat nutrient dense diet and might consume less healthy foods but in a mindful manner (Taylor et al., 2015). Many individuals nowadays are also eating while looking at a screen, which does not promote healthy eating.

REFERENCES

Aday, L. A., & Cornelius, L. J. (2006). *Designing and conducting health surveys*: A comprehensive guide (3rd ed.). San Francisco, CA, US: Jossey-Bass.

Ahmad Taufik, J., Aniza, I., Idayu Badilla, I., Kar, C. S., Ai, J. T., Nur Afiqah, B., & Muhamad Fadzlan, F. (2016). Levels of physical activity and its associated factors among health care workers. *Malaysian Journal of Public Health Medicine, 16*(3), 127-133.

Akira. S., Mohd Yusof, O., Wan Fatihah, Z. W. Z., Tan, C. S. Y., Nur Izatt, M. N., Tomojiria, D., & Furusawaa, T. (2018). Factors affecting body image perceptions of female college students in urban Malaysia. *Obesity Medicine, 11*, 13-19. https://doi.org/10.1016/j.obmed.2018.06.004

Albers, S. (2008). Eat, drink and be mindful: How to end your struggle with mindless eating and start savoring food with intention and joy. Oakland, CA: New Harbringer Publications.

Amalia, M. & Mohd Saizam, S. (2015). Depression, Anxiety, and Stress Scale (DASS-21) among counselling students: A preliminary study. *Journal of Cognitive Sciences and Human Development, 1*(1), 90-101. doi: https://doi.org/10.33736/jcshd.191.2015

American Psychological Association. (2008). *Anxiety*. Retrieved from https://www.apa.org/topics/anxiety

Anderson, L. M., Reilly, E. E., Schaumberg, K., Dmochowski, S., & Anderson, D. A. (2015). Contributions of mindful eating, intuitive eating, and restraint to BMI, disordered eating, and meal consumption in college students. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*, *21*(1), 83–90. doi: 10.1007/s40519-015-0210-3

Andrade, A. M., Greene, G. W., & Melanson, K. J. (2008). Eating slowly led to decreases in energy intake within meals in healthy women. *Journal of the American Dietetic Association*, *108*(7), 1186–1191. https://doi.org/10.1016/j.jada.2008.04.026

Anglé, S., Engblom, J., Eriksson, T., Kautiainen, S., Saha, M. T., Lindfors, P., Lehtinen, M & Rimpelä, A. (2009). Three-Factor Eating Questionnaire-R18 as a measure of cognitive restraint, uncontrolled eating and emotional eating in a sample of young Finnish females. *International Journal of Behavioral Nutrition and Physical Activity, 6*, 41. https://doi.org/10.1186/1479-5868-6-41

Avalos, L., Tylka, T. L., & Wood-Barcalow, N. (2005). The Body Appreciation Scale: Development and psychometric evaluation. *Body Image, 2(3), 285–297.* doi:10.1016/j.bodyim.2005.06.002

Azahadi, O., Lim, K. K., Hazizi, A. S., Khoo, Y. Y., Siti Fatimah, M. H., & Joanita, S. (2015). Physical inactivity among Malaysian adults: Which domain is the

worst? *Medical Journal of Malaysia, 70*, 62.

Bahl, S., Milne, G. R., Ross, S. M., & Chan, K. (2013). Mindfulness: A long-term solution for mindless eating by college students. *Journal of Public Policy and Marketing, 32*(2), 173–184. https://doi.org/10.1509/jppm.11.008

Berdal, L. M. (2012). Mindful eating: is there a relationship among gender, age, physical activity, grade level, focus of academic major and eating mindfulness among college students (Master's thesis, North Dakota State University). Retrieved from https://pdfs.semanticscholar.org/648c/2d17283bce19e55bde10817c694679838ba8.pdf

Blaak E. (2001). Gender differences in fat metabolism. *Current opinion in clinical nutrition and metabolic care, 4*(6), 499–502. https://doi.org/10.1097/00075197-200111000-00006

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*(4), 822–848. https://doi.org/10.1037/0022-3514.84.4.822

Bryan, S. (2016). Mindfulness and nutrition in college age students. *Journal of Basic & Applied Sciences, 12*, 68-74

Bull, F. C., Maslin, T. S., & Armstrong, T. (2009). Global Physical Activity Questionnaire (GPAQ): Nine country reliability and validity study. *Journal of Physical Activity and Health, 6*, 790-804.

Centers for Disease Control and Prevention. (2019). National Youth Risk Behavior Survey. Retrieve from https://www.cdc.gov/healthyyouth/data/yrbs/pdf/2019/2019_YRBS-National-HS-Questionnaire.pdf

Cheah, W. L., Majorie, E. J., Helmy, H., & Chang, C. T. (2018). Hypertension and its association with anthropometric indices among students in a public university. *Malaysian Family Physician, 13*(1), 2–9.

Chen, X., Pensuksan, W. C., Lohsoonthorn, V., Lertmaharit, S., Gelaye, B., & Williams, M. A. (2014). Obstructive sleep apnea and multiple anthropometric indices of general obesity and abdominal obesity among young adults. *International Journal of Social Science Studies, 2*(3), 89–99. https://doi.org/10.11114/ijsss.v2i3.439

Chin, Y. S., Appukutty, M., Kagawa, M., Gan, W. Y., Wong, J. E., Poh, B. K., Zalilah, M. S., & Mohd Nasir, M. T. (2020). Comparison of factors associated with disordered eating between male and female Malaysian university students. *Nutrients, 12*(2), 318. doi:10.3390/nu12020318

Chu, A. H. Y., & Moy, F. M. (2015). Reliability and validity of the Malay International Physical Activity Questionnaire (IPAQ-M) among a malay population in

Malaysia. *Asia Pacific Journal of Public Health, 27*(2), NP2381–NP2389. doi:10.1177/1010539512444120

Cummins, L. H., Simmons, A. M., & Zane, N. W. S. (2005). Eating disorders in asian populations: a critique of current approaches to the study of culture, ethnicity, and eating disorders. *American Journal of Orthopsychiatry*, *75*(4), 553–574. doi:10.1037/0002-9432.75.4.553

Dalen, J., Smith, B.W., Shelley, B.M., Sloan, A.L., Leahigh, L., & Begay, D. (2010). Pilot study: Mindful Eating and Living (MEAL): Weight, eating behavior, and psychological outcomes associated with a mindfulness-based intervention for people with obesity. *Complement Therapies in Medicine*, *18*(6), 260–264.

Davis, L., Anderson, D., & Pobocik, R. (2014). The relationships between mindful eating, weight, and quality of life in college students. *Journal of Nutrition Education and Behavior*, *46*(4), S171–S172. doi:10.1016/j.jneb.2014.04.246

Dickson, C. S. S., Tharshini, S. R., Dhivya, E., & Abd Rauf Fahmi, M. (2019). A cross sectional study on association of anxiety disorder and emotional eating on sweet cravings among medical students in Malaysia. *American Journal of Food Science and Health, 5*(3), 104–111.

Durukan, A., & Gül, A. (2019). Mindful eating: Differences of generations and relationship of mindful eating with BMI. *International Journal of Gastronomy and Food Science, 18*, 100172. https://doi.org/10.1016/j.ijgfs.2019.100172

Finger, I. da R., de Freitas, B. I., & Oliveira, M. da S. (2018). Psychological inflexibility in overweight and obese people from the perspective of acceptance and commitment therapy (ACT). *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*. https://doi.org/10.1007/s40519-018-0541-y

Framson, C., Kristal, A. R., Schenk, J., Littman, A. J., Zeliadt, S., & Benitez, D. (2009). Development and validation of the mindful eating questionnaire. *American Dietetic Association*, *109*(8), 1439–1444. https://doi.org/10.1038/jid.2014.371

Fred Hutchinson Cancer Research Center. (2009). Regular yoga practice is associated with mindful eating. 7–9. Retrieved from https://www.sciencedaily.com/releases/2009/08/090803185712.htm

Frehlich, L. C., Eller, L. K., Parnell, J. A., Fung, T. S., & Reimer, R. A. (2017). Dietary intake and associated body weight in canadian undergraduate students enrolled in nutrition education. *Ecology of Food and Nutrition, 56*(3), 205–217. doi:10.1080/03670244.2017.1284066

Gan, W. Y., Chin, P. Q., & Law, L.S. (2019). Determination of risk factors for night eating syndrome among public university students in Malaysia. *Malaysian Journal of Medicine and Health Sciences, 15*(SP1): 25-32.

Gan, W. Y., Mohd Nasir, M. T., Zalilah, M. S., & Hazizi, A. S. (2011a). Differences

in eating behaviours, dietary intake and body weight status between male and female Malaysian university students. *Malaysian Journal of Nutrition*, *17*(2), 213–228.

Gan, W. Y., Mohd Nasir, M. T., Zalilah, M. S., & Hazizi, A. S. (2011b). Disordered eating behaviors, depression, anxiety and stress among Malaysian university students. *The College Student Journal, 45*(2), 296-309.

Gan, W. Y., & Yeoh, W. C. (2017). Associations between body weight status, psychological well-being and disordered eating with intuitive eating among Malaysian undergraduate university students. *International Journal of Adolescent Medicine and Health, 32*(2), 1-8. doi:10.1515/ijamh-2017-0095

Giannopoulou, I., Kotopoulea-Nikolaidi, M., Daskou, S., Martyn, K., & Patel, A. (2020). Mindfulness in eating is inversely related to binge eating and mood disturbances in university students in health-related disciplines. *Nutrients, 12*(2), 396. doi: 10.3390/nu12020396

Gidugu, V., & Jacobs, M. L. (2018). Empowering individuals with mental illness to develop healthy eating habits through mindful eating: results of a program evaluation. *Psychology, Health and Medicine*, *24*(2), 177–186. https://doi.org/10.1080/13548506.2018.1516295

Goje, M., Salmiah, M. S., Ahmad Azuhairi, A., & Jusoff, K. (2014). Physical inactivity and its associated factors among university students. *IOSR Journal of Dental and Medical Sciences, 13*(10), 119-130.

Grinnell, S., Greene, G., Melanson, K., Blissmer, B., & Lofgren, I. E. (2011). Anthropometric and behavioral measures related to mindfulness in college students. *Journal of American College Health*, *59*(6), 539–545. https://doi.org/10.1080/07448481.2011.555932

Halliwell, E. (2013). The impact of thin idealized media images on body satisfaction: Does body appreciation protect women from negative effects?. *Body Image, 10*, 509–514. http://dx.doi.org/10.1016/j.bodyim.2013.07.004

Hendrickson, K. L., & Rasmussen, E. B. (2017). Mindful eating reduces impulsive food choice in adolescents and adults. *Health Psychology, 36*(3), 226–235. doi:10.1037/hea0000440

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 44*(2), 227–239. doi:10.1348/014466505x29657

Hertelyova, Z., Salaj, R., Chmelarova, A., Dombrovsky, P., Dvorakova, M. C., & Kruzliak, P. (2015). The association between lipid parameters and obesity in university students. *Journal of Endocrinological Investigation, 39*(7), 769–778. doi:10.1007/s40618-015-0240-8

Hudnall, M. (2019). Self-compassion: The often missing ingredient in healthy eating. Retrieved from https://www.mindful.org/self-compassion-the-often-missing-ingredient-in-healthy-eating/

Hulbert-Williams, L., Nicholls, W., Joy, J., & Hulbert-Williams, N. (2013). Initial validation of the mindful eating scale. *Mindfulness, 5*(6), 719–729. doi:10.1007/s12671-013-0227-5

Hulley, S. B., Cummings, S. R., Browner, W. S., Grady, D., Newman, T. B. (2013). Designing clinical research : an epidemiologic approach *(4th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Institute for Public Health (IPH). (2017). National Health and Morbidity Survey (NHMS) 2017: Adolescent Nutrition Survey 2017. Kuala Lumpur: Ministry of Health Malaysia.

Institute for Public Health (IPH). (2019). National Health and Morbidity Survey (NHMS) 2019: Non-communicable diseases, healthcare demand, and heath literacy-Key Findings. Kuala Lumpur: Ministry of Health Malaysia.

Intiful, F. D., Oddam, E. G., Kretchy, I., & Quampah, J. (2019). Exploring the relationship between the big five personality characteristics and dietary habits among students in a Ghanaian University. *BMC Psychology*, *7*(10), 1–7. https://doi.org/10.1186/s40359-019-0286-z

Kabat-Zinn J. (1991). Full Catastrophe Living. New York, N.Y, Dell Publishing.

Kaipainen, K., Payne, C. R., & Wansink, B. (2012). Mindless eating challenge: retention, weight outcomes, and barriers for changes in a public web-based healthy eating and weight loss program. *Journal of Medical Internet Research, 14*(6), e168. doi: 10.2196/jmir.2218

Karastergiou, K., Smith, S. R., Greenberg, A. S., & Fried, S. K. (2012). Sex differences in human adipose tissues – the biology of pear shape. *Biology of Sex Differences, 3*(13). https://doi.org/10.1186/2042-6410-3-13

Karlsson, J., Persson, L. O., Sjöström, L., & Sullivan, M. (2000). Psychometric properties and factor structure of the Three-Factor Eating Questionnaire (TFEQ) in obese men and women. Results from the Swedish Obese Subjects (SOS) study. *International Journal of Obesity, 24*(12), 1715

Kavazidou, E., Proios, M., Liolios, I., Doganis, G., Petrou, K., Tsatsoulis, A., & Tsiligiroglou-Fachantidou, A. (2012). Structure validity of the three-factor eating questionnaire-R18 in Greek population. *Journa lof Human Sport & Exercise, 7*(1), 218-226. doi:10.4100/jhse.2012.71.01

Kelly, A. C., Vimalakanthan, K., & Carter, J. C. (2014). Understanding the roles of self-esteem, self-compassion, and fear of self-compassion in eating disorder pathology: An examination of female students and eating disorder patients. *Eating Behaviors, 15(3), 388–391.* doi:10.1016/j.eatbeh.2014.04.008

Kennedy, L. E., Serrano, E. L., Hosig, K. W., Duffet, K. J., & Ju, Y. H. (2016). The examination of mindfulness, stress, and eating behaviors in mothers of young children. *Journal of Chemical Information and Modeling*, *53*(9), 1689–1699. https://doi.org/10.1017/CBO9781107415324.004

Khan, T., Khan, Z. A., Kochhar, S., Singh, B., Goyal, G. L., & Sharma, R. (2018). Unfeasible body mass index and its association with low haemoglobin concentration: a correlation study among undergraduate medical students. *International Journal of Research in Medical Sciences, 6*(12), 4002-4007. doi: http://dx.doi.org/10.18203/2320-6012.ijrms20184898

Köse, G., & Çıplak, M. E. (2020). Does mindful eating have a relationship with gender, body mass index and health promoting lifestyle? Mindful eating BMI health. *Progress in Nutrition, 22*(2), 528-535. https://doi.org/10.23751/pn.v22i2.9268

Kotera, Y., Green, P., & Van Gordon, W. (2018). Mental wellbeing of caring profession students: relationship with caregiver identity, self-compassion, and intrinsic motivation. *Mindfulness & Compassion*.

Kristanto, T., Chen, W. S., & Thoo, Y. Y. (2016). Academic burnout and eating disorder among students in Monash University Malaysia. *Eating Behaviors, 22*, 96–100. https://doi.org/10.1016/j.eatbeh.2016.03.029

Kristeller, J., Wolever, R. Q., & Sheets, V. (2014). Mindfulness-Based Eating Awareness Training (MB-EAT) for binge eating: a randomized clinical trial. *Mindfulness, 5*(3), *282–297.* doi:10.1007/s12671-012-0179-1

Lee, R. D. & Nieman, D. C. (2003). *Nutritional assessment* (3rd ed.). New York: McGraw-Hill.

Lek, F. Y., Ong, H. H., & Say, Y. H. (2018). Association of dopamine receptor D2 gene (DRD2) Taq1 polymorphisms with eating behaviors and obesity among Chinese and Indian Malaysian university students. *Asia Pacific Journal of Clinical Nutrition, 27*(3), 707-717

Levitan, R. D., & Davis, C. (2010). Emotions and eating behaviour: implications for the current obesity epidemic. University of Toronto Quarterly, 79*(*2), 783-799

Lim, Z. M., Chie, Q. T., & Teh, L. K. (2019). Influence of dopamine receptor gene on eating behaviour and obesity in Malaysia. *Meta Gene*. https://doi.org/10.1016/j.mgene.2020.100736

Lofgren, I. E. (2015). Mindful Eating: An emerging approach for healthy weight management. *American Journal of Lifestyle Medicine, 9*(3), 212–216. https://doi.org/10.1177/1559827615569684

Lovibond, S. H., & Lovibond, P. F. (1995). Manual for the Depression Anxiety Stress Scales. 2nd ed. Sydney: Psychology Foundation of Australia. Psychology Foundation of Australia. doi:10.1016/0005-7967(94)00075-U

Mahmuda, M., Muhammad Abdul Baker, C., Md Nazrul, I., Arifa, A., Farha Nusrat, Z., Mst. Farzana, A., Shamima, N. M., Tania, A. T., Tanjila A., Tanjila, I., & Md Jamal, U. (2019). Factors associated with body mass index among university students in Bangladesh. *Journal of Public Health* doi:10.1007/s10389-019-01124-x

Mantzios, M., Egan, H., Bahia, H., Hussain, M., & Keyte, R. (2018a). How does grazing relate to body mass index, self-compassion, mindfulness and mindful eating in a student population? *Health Psychology Open*, *5*, 1–7. https://doi.org/10.1177/2055102918762701

Mantzios, M., Egan, H., Hussain, M., Keyte, R., & Bahia, H. (2018b). Mindfulness, self-compassion, and mindful eating in relation to fat and sugar consumption: an exploratory investigation. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*, *23*(6), 833–840. https://doi.org/10.1007/s40519-018-0548-4

Mantzios, M., & Wilson, J. C. (2015). Mindfulness, eating behaviours, and obesity: A review and reflection on current findings. *Current Obesity Reports, 4*, 141–146. doi: 10.1007/s13679-014-0131-x

Maruyama, T., Yamamoto, N., Kajitani, K., Tsuchimoto, R., Masaki, Y., Nagano, J., Irie, M., Ichimiya, A., Yamamoto, K., & Uezono, K. (2017). Correlations between anthropometrics and electrocardiographic variables in japanese university students: Investigation by annual health screening. *Cardiology and Angiology: An International Journal*, *6*(4), 1-12. https://doi.org/10.9734/CA/2017/36193

Mathieu, J. (2009). What should you know about mindful and intuitive eating?. *Journal of the American Dietetic Association*, *109*(12). https://doi.org/10.1016/j.jada.2009.10.023

Md. Ashraful, I., Wah, Y. L., Wen, T. T., Claire, C. W. Y., & Adina, A. (2018). Factors associated with depression among university students in Malaysia: a cross-sectional study. *The 2nd International Meeting of Public Health 2016 with theme "Public Health Perspective of Sustainable Development Goals: The Challenges and Opportunities in Asia-Pacific Region",Volume 2018,* KnE Life Sciences, 415–427. doi: 10.18502/kls.v4i4.2302

Miller, C. K., Kristeller, J. L., Headings, A., Nagaraja, H., & Miser, W. F. (2012). Comparative Effectiveness of a mindful eating intervention to a diabetes self-management intervention among adults with type 2 diabetes: A pilot study. *Journal of Nutrition and Dietetics, 112*(11), 1835–1842. doi:10.1016/j.jand.2012.07.036.

Moor, K. R., Scott, A. J., & McIntosh, W. D. (2012). Mindful eating and its relationship to body mass index and physical activity among university students. *Mindfulness*, *4*(3), 269–274. https://doi.org/10.1007/s12671-012-0124-3

Moreno-Gómez, C., Romaguera-Bosch, D., Tauler-Riera, P., Bennasar-Veny, M., Pericas-Beltran, J., Martinez-Andreu, S., & Aguilo-Ponset, A.(2012). Clustering of lifestyle factors in Spanish university students: The relationship between smoking, alcohol consumption, physical activity and diet quality. *Public Health Nutrition, 15*(11):2131-9. https:// doi.org/10.1017/S1368980012000080

Muhammad Zubair, S., Tayyab Mumtaz, K., Qurat-ul-ain, Q., Muhammad Junaid, A., Hassan, J., Mariam, Y., Maria, T. R., Areeba, Z., & Muhammad Hamza. (2019). Association of physical activity and sleep quality with academic performance among fourth year MBBS students of Rawalpindi Medical University. *Cureus, 11*(7). https://doi.org/10.7759/cureus.5086

National Institute of Mental Health. (2019). *5 things you should know about stress*. Retrieved from https://www.nimh.nih.gov/health/publications/stress/index.shtml

Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. *Self and Identity, 2*, 223–250. http://dx.doi.org/10.1080/15298860309027

Nelson, J. B. (2017). Mindful Eating: The art of presence while you eat. *Diabetes Spectrum, 30*(3), 171–174. doi:10.2337/ds17-0015

Nola, I. A., Jelinié, J. D., Matanié, D., Pucarin-Cvetkovié, J., Markovié, B. B., & Senta, A. (2010). Differences in eating and lifestyle habits between first- and sixth-year medical students from Zagreb. *Coll Antropol. 34*(4):1289-94.

Noorlila, A., Samsilah, R., Shamsuddin, O., Shureen Faris, A. S., & Abu Yazid, A. B. (2018). The validity and reliability of psychometric profile for Depression, Anxiety and Stress Scale (DASS21) Instrument among Malaysian undergraduate students. *International Journal of Academic Research in Business and Social Sciences, 8*(6), 812-827.

Norudin, M., Mohamad, Z., Zalinawati, A., & Kartini, M. R. (2016). Meal selection of University's Students. *Medwell Journal, 11*(7), 7461-7466

Nurul Syafika, A. H., Nik Daliana, N. F., Abqariyah, Y., Caroline, C., Tin, T. S., Sanjay, R. L. R., & Maznah, D. (2019). The prevalence and associated factors of depression, anxiety and stress of first year undergraduate students in a public higher learning institution in Malaysia. *Journal of Child and Family Studies,* 1–13. https://doi.org/10.1007/s10826-019-01537-y

Pérusse-Lachance, E., Tremblay, A., & Drapeau, V. (2010). Lifestyle factors and other health measures in a Canadian university community. *Applied Physiology, Nutrition, and Metabolism, 35*(4):498-506. https://doi.org/10.1139/H10-035

Pidgeon, A., Lacota, K., & Champion, J. (2012). The moderating effects of mindfulness on psychological distress and emotional eating behaviour. *Australian Psychologist, 48,* 262-269. doi:10.1111/j.1742-9544.2012.00091.x

Pierson, S., Goto, K., Giampaoli, J., Wylie, A., Seipel, B., Karnik, G., & Yang, S.

(2016). Factors associated with emotional eating and mindless eating among third to fifth grade students. *Journal of Nutrition Education and Behavior, 48(7), S99.* doi:10.1016/j.jneb.2016.04.261

Pintado-Cucarella, S., & Rodríguez-Salgado, P. (2016). Mindful eating and its relationship with body mass index, binge eating, anxiety and negative affect. *Journal of Behavior, Health & Social Issues, 8,* 19–24. https://doi.org/10.1016/j.jbhsi.2016.11.003

Quittkat, H. L., Hartmann, A. S., Dusing, R., Buhlmann, U., & Vocks, S. (2019). Body dissatisfaction, importance of appearance, and body appreciation in men and women over the lifespan. *Front. Psychiatry, 10*, 864. doi:10.3389/fpsyt.2019.00864

Radwan, H., Hasan, H. A., Ismat, H., Hakim, H., Khalid, H., Al-Fityani, L., Mohammed, R., Ayman, A. (2019). Body mass index perception, body image dissatisfaction and their relations with weight-related behaviors among university students. *International Journal of Environmntal Research and Public Health, 16,* 1541. https://doi.org/10.3390/ijerph16091541

Raes, F., Pommier, E., Neff, K. D., & Van Gucht, D. (2011). Construction and factorial validation of a short form of the Self-Compassion Scale. *Clinical Psychology & Psychotherapy, 18,* 250–255. http://dx.doi.org/10.1002/cpp.702

Ramírez-Vélez, R., Correa-Bautista, J. E., Sanders-Tordecilla, A., Ojeda-Pardo, M. L., Cobo-Mejía, E. A., Castellanos-Vega, R., García-Hermoso, A., González-Jiménez, E., Schmidt-RioValle, J., & González-Ruíz, K. (2017). Percentage of Body Fat and Fat Mass Index as a Screening Tool for Metabolic Syndrome Prediction in Colombian University Students. *Nutrients*, *9*(9), 1009. https://doi.org/10.3390/nu9091009

Ranita, M., Sohana, A. H., & Marhaini, A. G. (2019). Depression, anxiety and stress among undergraduate students. *Journal of Social Sciences and Humanities*, *16*(2), 1–7, ISSN: 1823-884x

Raseta, N., Simovic, S., Djuric, S., Suzic, N., Prtina, A., & Zeljkovic, N. (2018). Eating habits and standard body parameters among students at university of banja luka. *Serbian Journal of Experimental and Clinical Research, 19*(1), 41–49. doi:10.1515/sjecr-2017-0014

Román, N., & Urbán, R. (2019). Mindful awareness or self-regulation in eating: an investigation into the underlying dimensions of mindful eating. *Mindfulness*, *10*, 2110–2120. https://doi.org/10.1007/s12671-019-01170-2

Salwani, A., Suriati, S., Aliza, H. H., Wan Azdie, M. A. B., & Tubanur, I. U. (2019). Mindful eating practice predicts lower body mass index among university students. *Pakistan Journal of Nutrition, 18*(10), 977-982. doi: 10.3923/pjn.2019.977.982

Şanlier, N., Türközü, D., & Toka, O. (2016). Body image, food addiction, depression,

and body mass index in university students. *Ecology of Food and Nutrition, 55*(6), 491–507. doi:10.1080/03670244.2016.1219951

Siti Norazilah, M. S., Nisha Nurshazwani, B., Shaira Parveen, H., Madihie, A., & Salmah, M. Y. (2017). Development of mindfulness module for promoting healthy lifestyle among female students in higher education institution. *International Journal of Business and Society*, *18*(S4), 854–861.

Soo, K. L., Wan Abdul Manan, W. M., & Wan Suriati, W. N. (2015). the bahasa melayu version of the global physical activity questionnaire. *Asia Pacific Journal of Public Health, 27*(2), NP184–NP193. doi:10.1177/1010539511433462

Swami, V., Nor Azzatunnisak, M. K., Toh, E., Hanoor Syahirah, Z., Todd, J., & Barron, D. (2019). Factor structure and psychometric properties of a Bahasa Malaysia (Malay) translation of the Body Appreciation Scale-2 (BAS-2). *Body Image, 28,* 66–75. doi:10.1016/j.bodyim.2018.12.006

Tahereh, M., Rosita, J., & Hazizi, A. S. (2015). Lifestyle and psychological factors associated with body weight status among university students in Malaysia. *Pakistan Journal of Nutrition*, *14*(1), 18–28. https://doi.org/10.3923/pjn.2015.18.28

Talwar, P., Tan, K. W., Kartini, A. G., & Nur Fatihah, M. Y. (2016). The goodness-of-fit of dass-21models among university students. *Malaysian Journal of Public Health Medicine, 16* (3), 219-226.

Taylor, M. B., Daiss, S., & Krietsch, K. (2015). Associations among self-compassion, mindful eating, eating disorder symptomatology, and body mass index in college students. *Translational Issues in Psychological Science*, *1*(3), 229–238. https://doi.org/10.1037/tps0000035

Teh, C. K., Ngo, C. W., Rashidatul Aniyah, Z., Vellasamy, R., & Suresh, K. (2015). Depression, anxiety and stress among undergraduate students: a cross sectional study. *Open Journal of Epidemiology, 5*, 260-268. http://dx.doi.org/10.4236/ojepi.2015.54030

The Center for Mindful Eating. (2013). *The principles of mindful eating*. Retrieved from https://www.thecenterformindfuleating.org/Principles-Mindful-Eating

Tosevski, D. L., Milovancevic, M. P., & Gajic, S. D. (2010). Personality and psychopathology of university students. *Current Opinion in Psychiatry*, *23*(1), 48–52. https://doi.org/10.1097/YCO.0b013e328333d625

Tylka, T. L., & Wood-Barcalow, N. L. (2015). The body appreciation Scale-2: Item refinement and psychometric evaluation. *Body Image, 12*, 53–67. http://dx.doi.org/10.1016/j.bodyim.2014.09.006.

University of New South Wales. (2009). Why do women store fat differently from men? *ScienceDaily*. Retrieved July 19, 2020 from www.sciencedaily.com/releases/2009/03/090302115755.htm

Victor, M., Rauf, N., & Samuel, A. (2014). Lifestyle risk factors of general and abdominal obesity in students of the School of Medicine and Health Science of the University of Development Studies, Tamale, Ghana. ISRN Obesity, 1-10. http://dx.doi.org/10.1155/2014/508382

Wang, J., Chen, Y., Jin, Y., Zhu, L., & Yao, Y. (2019). Sleep quality is inversely related to body mass index among university students. *Revista da Associação Médica Brasileira*, *65*(6), 845-850. https://doi.org/10.1590/1806-9282.65.6.845

Webb, J. B., Rogers, C. B., Etzel, L., & Padro, M. P. (2018). "Mom, quit fat talking—I'm trying to eat (mindfully) here!": Evaluating a sociocultural model of family fat talk, positive body image, and mindful eating in college women. *Appetite*, *126*, 169–175. https://doi.org/10.1016/j.appet.2018.04.003

Winkens, L. H. H., van Strien, T., Brouwer, I. A., Penninx, B. W. J. H., Visser, M., & Lähteenmäki, L. (2018). Associations of mindful eating domains with depressive symptoms and depression in three European countries. *Journal of Affective Disorders*, *228*, 26–32. https://doi.org/10.1016/j.jad.2017.11.069

WHO/IOTF/IASO. (2000). *The Asia-Pacific perspective: Redefining Obesity and its Treatment*. Australia: World Health Organization, International Obesity Task Force, International Association for the Study of Obesity.

Willard, C. (2019). *6 ways to practice mindful eating*. Retrieved from https://www.mindful.org/6ways practice mindful eating/

World Health Organization. (2000). *Obesity: Preventing and managing global epidemic*. WHO Technical Report Series 894. Geneva: World Health Organization.

World Health Organization. (2012). Depression, a hidden burden. Retrieved from http://www.who.int/mental_health/management/depression/flyer_depression_2012.pdf?ua=1

World Health Organization. (2012). Global Physical Activity Questionnaire (GPAQ) Analysis Guide. Geneva: World Health Organization.

World Health Organization. (n.d.). Global physical activity surveillance. Retrieved from https://www.who.int/ncds/surveillance/steps/GPAQ/en/

Yadav, S. S., Saini, P., Khan, Z. A., Bachloo, T., Kumar, R., & Singh, J. (2016). Assessment of body mass index among undergraduate medical students—a cross-sectional study from the Medical College of Haryana. *International Journal of Medical Science and Public Health*, *5*(4), 705-708. doi: 10.5455/ijmsph.2016.01092015116

Yusoff, N. A. M., Ganeson, S., Ismail, K. F., Juahir, H., Shahril, M. R., Lin, L. P., Ahmad, A., Wafa, S. W., Harith, S., & Rajikan, R. (2018). Physical activity level among undergraduate students in Terengganu, Malaysia using pedometer.

Journal of Fundamental and Applied Sciences, 10(1S), 512-522.

Zaccagni, L., Barbieri, D. & Gualdi-Russo, E. (2014). Body composition and physical activity in Italian university students. *Journal of Translation Medicine, 12*(120). https://doi.org/10.1186/1479-5876-12-120

Zulkhairul Naim, Khairul Anwar, Abdul Rahman, & Nur Zuliani. (2016). Physical inactivity among medical and non-medical students: a cross sectional study. *International Journal of Public Health and Clinical Sciences, 3*(5), 48-58.

APPENDIX A

Ethics approval letter from JKEUPM

ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS
(JKEUPM)
UNIVERSITI PUTRA MALAYSIA

Research title	:	**Factors Associated with Mindful Eating among Undergraduate Students in Universiti Putra Malaysia.**
Study Site	:	**Universiti Putra Malaysia**
JKEUPM Ref No.	:	**JKEUPM-2019-413**
Researcher	:	**Wan Nuratika Wan Zainulabidin**
Supervisor	:	**Assoc. Prof. Dr. Gan Wan Ying**

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 22/10/2019
2. Respondent Information Sheet & Consent (English), Version 1 dated 22/10/2019
3. Respondent Information Sheet & Consent (Malay), Version 1 dated 22/10/2019
4. Proposal (English), Version 2 dated 30/12/2019
5. Questionnaires/ Interviews (English), Version 1 dated 22/10/2019
6. Curriculum Vitae of:
    a. Assoc. Prof. Dr. Gan Wan Ying

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

Decision by JKEUPM:

[X] Approved

[X] **Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research**

[ ] Disapproved

Please note that the approval is **VALID UNTIL 22 JANUARY 2021**

Researchers should comply with the following:

I. Complete a Study Final Report upon study completion (Form 3.2).

II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.

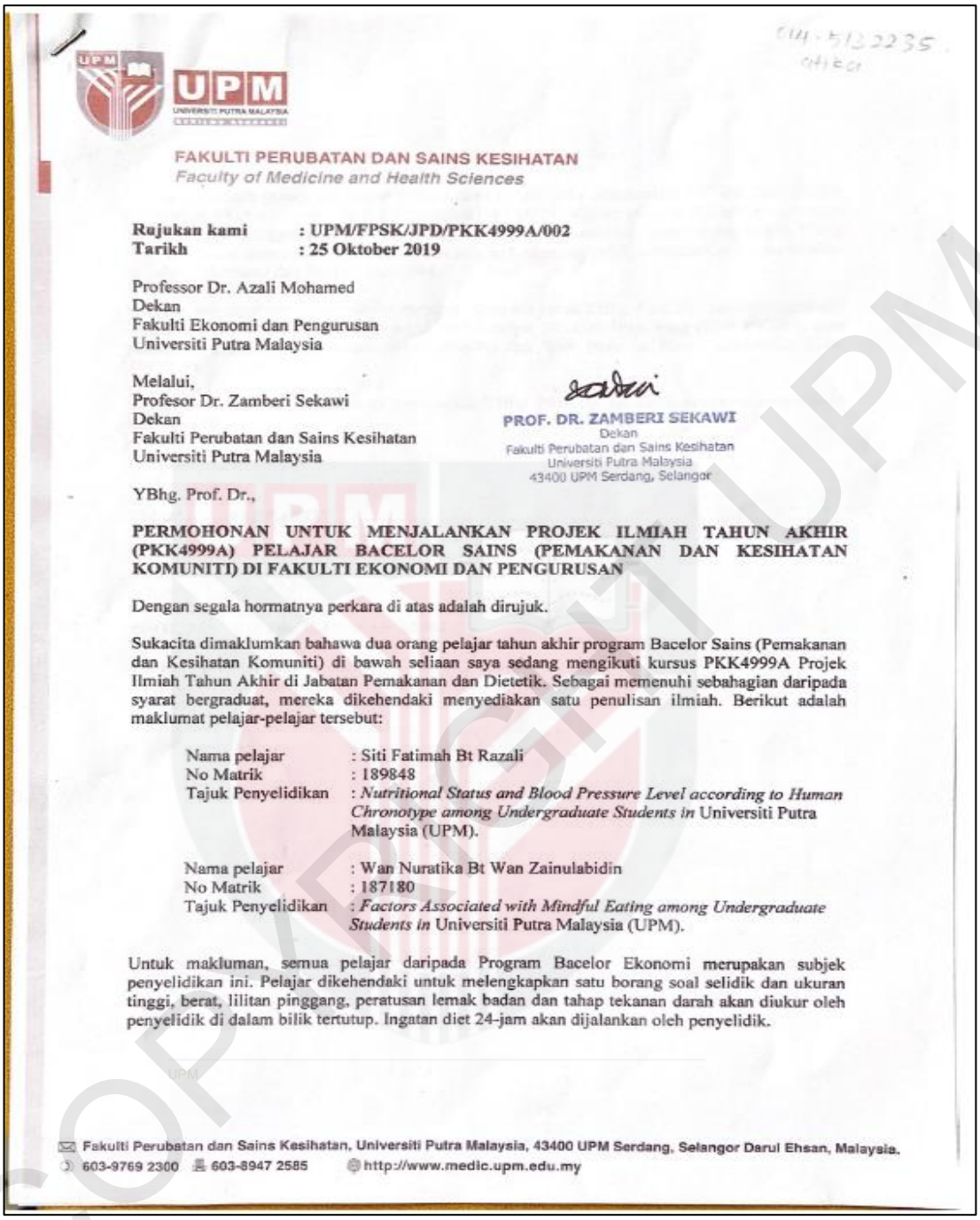
APPENDIX B

Permission letter from deans

-Faculty of Medicine and Health Sciences

-Faculty of Economics

-Faculty of Engineering



FAKULTI PERUBATAN DAN SAINS KESIHATAN
Faculty of Medicine and Health Sciences

Rujukan kami : **UPM/FPSK/JPD/PKK4999A/002**
Tarikh : **25 Oktober 2019**

Professor Dr. Azali Mohamed
Dekan
Fakulti Ekonomi dan Pengurusan
Universiti Putra Malaysia

Melalui,
Profesor Dr. Zamberi Sekawi
Dekan
Fakulti Perubatan dan Sains Kesihatan
Universiti Putra Malaysia

PROF. DR. ZAMBERI SEKAWI
Dekan
Fakulti Perubatan dan Sains Kesihatan
Universiti Putra Malaysia
43400 UPM Serdang, Selangor

YBhg. Prof. Dr.,

PERMOHONAN UNTUK MENJALANKAN PROJEK ILMIAH TAHUN AKHIR (PKK4999A) PELAJAR BACELOR SAINS (PEMAKANAN DAN KESIHATAN KOMUNITI) DI FAKULTI EKONOMI DAN PENGURUSAN

Dengan segala hormatnya perkara di atas adalah dirujuk.

Sukacita dimaklumkan bahawa dua orang pelajar tahun akhir program Bacelor Sains (Pemakanan dan Kesihatan Komuniti) di bawah seliaan saya sedang mengikuti kursus PKK4999A Projek Ilmiah Tahun Akhir di Jabatan Pemakanan dan Dietetik. Sebagai memenuhi sebahagian daripada syarat bergraduat, mereka dikehendaki menyediakan satu penulisan ilmiah. Berikut adalah maklumat pelajar-pelajar tersebut:

Nama pelajar	: Siti Fatimah Bt Razali
No Matrik	: 189848
Tajuk Penyelidikan	: *Nutritional Status and Blood Pressure Level according to Human Chronotype among Undergraduate Students in* Universiti Putra Malaysia (UPM).

Nama pelajar	: Wan Nuratika Bt Wan Zainulabidin
No Matrik	: 187180
Tajuk Penyelidikan	: *Factors Associated with Mindful Eating among Undergraduate Students in* Universiti Putra Malaysia (UPM).

Untuk makluman, semua pelajar daripada Program Bacelor Ekonomi merupakan subjek penyelidikan ini. Pelajar dikehendaki untuk melengkapkan satu borang soal selidik dan ukuran tinggi, berat, lilitan pinggang, peratusan lemak badan dan tahap tekanan darah akan diukur oleh penyelidik di dalam bilik tertutup. Ingatan diet 24-jam akan dijalankan oleh penyelidik.

Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor Darul Ehsan, Malaysia.
603-9769 2300 603-8947 2585 http://www.medic.upm.edu.my

APPENDIX C

Information sheet and consent form

2.4: RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

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

1. STUDY TITLE:.

Factors associated with mindful eating among undergraduate students in Universiti Putra Malaysia

2. INTRODUCTION:

In this era of technology and globalisation, many young adults opt to eat fast food while working on their laptops, and some of them munch on their breakfast while walking to lecture hall or during lecture. These are examples of mindless eating, which can lead to overeating, thus resulting in health problems such as obesity among university students. A way to reverse this behaviour is by slowing down and practising mindful eating, as part of a healthy lifestyle. Mindful eating is about being conscious of our eating habits and involves paying full attention to the experience of eating and drinking. It emphasizes on how to eat than what to eat or what not to eat. University students are prone to poor dietary habits. If students who soon are entering adulthood persist poor eating habits, they might suffer negative health effects such as obesity, diabetes, high blood pressure and heart disease. Therefore, this study aims to determine the factors associated with mindful eating among undergraduate students in Universiti Putra Malaysia (UPM).

This study is part of the graduation requirement for Bachelor of Science (Nutrition and Community Health) from Faculty of Medicine and Health Sciences, UPM which is expected to be completed within one year of study. A total of 249 undergraduate students from UPM will participate in this study.

3. WHAT WILL YOU HAVE TO DO?

You need to read and understand about this study in this Respondent's Information Sheet. If you voluntarily agree to participate in this study, you are required to sign the respondent's consent form in Page 3. Upon completing the respondent's consent form, please return it to the researcher.

During data collection, you need to complete a set of questionnaires consisting of socio-demographic characteristics, mindful eating, physical activity, eating behaviors, depression, anxiety, stress, body appreciation and self-compassion. Your body weight, height, waist circumference and body fat percentage will be measured by the researcher in a closed room.

Your participation to complete this study will take approximately 20 minutes. Your participation in this study is voluntary. You have the right to withdraw from this study anytime without giving any reasons and no penalty will be applied upon your withdrawal.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

Students who are:

a) international students
b) foundation or postgraduate students
c) physically disabled
d) pregnant students
e) presence of chronic illnesses such as diabetes mellitus, heart disease, kidney disease and liver disease.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

You will get information on your body weight, height, BMI, body fat percentage and waist circumference.

(b) TO THE INVESTIGATOR?

Findings of this study will provide information on factors associated with mindful eating among undergraduate students. Findings of this study can serve as baseline data for future research and it is hoped to help health professionals to develop appropriate intervention and health promotion programs in improving nutritional status and healthy eating behaviours among undergraduate students.

6. WHAT ARE THE POSSIBLE RISK?

This study has minimal risk where it only involves anthropometry measurements as well as filling up a questionnaire. If you are found to have any psychological problems, you will be referred to a counselor.

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

All information provided will be remained confidential and used for academic purposes only. Researchers will not disclose your name or any personal information to third parties. No individual description will be made on any parts of the study or publication.

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

If you have any enquiries, you can contact as follows:

Researcher
Wan Nuratika Binti Wan Zainulabidin
014-5132235
wannuratika97@gmail.com
Department of Nutrition and Dietetics,
Faculty of Medicine and Health Sciences,
Universiti Putra Malaysia, 43400,
Serdang, Selangor

Supervisor
Assoc. Prof. Dr. Gan Wan Ying
03-97692469
wanying@upm.edu.my
Department of Nutrition and Dietetics,
Faculty of Medicine and Health Sciences,
Universiti Putra Malaysia, 43400,
Serdang, Selangor

*Please initial here if you have read and understood the contents of this page*_____

9. CONSENT

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

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

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

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

* delete where necessary

Signature .....
(Respondent)

Signature .....
(Witness)

Date :.....

Name :.....

I/C No. :.....

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

Date .....

Signature .....
(Researcher)

APPENDIX D

Self-administered questionnaire

Reference No: .....

FACULTY OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF NUTRITION AND DIETETICS

QUESTIONNAIRE

"CONFIDENTIAL"

RESEARCH TITLE:

FACTORS ASSOCIATED WITH MINDFUL EATING AMONG UNDERGRADUATE STUDENTS IN UNIVERSITI PUTRA MALAYSIA

Researcher : Wan Nuratika binti Wan Zainulabidin (187180)

Supervisor : Assoc. Pof. Dr. Gan Wan Ying

Date : / / 20__

Instruction: Questions in this questionnaire form are for academic purposes only. All information collected is secured. Your involvement and cooperation are greatly appreciated.

1

SECTION A

Instruction: Fill in the blank or tick (√) in the space provided below.

No	Information	Choices
1.	Date of birth	___ / ___ / _____ (dd/mm/yyyy)
2.	Sex	[ ] Male [ ] Female
3.	Ethnicity	[ ] Malay [ ] Chinese [ ] Indian [ ] Others: .....
4.	Faculty	
5.	Course of study	
6.	Year of study	[ ] 1st year [ ] 2nd year [ ] 3rd year [ ] 4th year [ ] 5th year [ ] Others: .....
7.	Living arrangement	[ ] Dormitory [ ] Rented house [ ] Own house [ ] Others: .....
8.	Monthly personal allowance	RM_____

SECTION B

Instruction: Answer all the questions and tick (√) one answer only in the space provided below.

No	Items	Not applicable	Never/rarely	Sometime	Often	Usually/always
1	I eat so quickly that I don't taste what I'm eating.		☐	☐	☐	☐
2	When I eat at "all you can eat" buffets, I tend to overeat.	☐ I don't eat at buffets	☐	☐	☐	☐
3	At a party where there is a lot of good food, I notice when it makes me want to eat more food than I should.		☐	☐	☐	☐
4	I recognize when food advertisements make me want to eat.	☐ Food ads never make me want to eat	☐	☐	☐	☐
5	When a restaurant portion is too large, I stop eating when I'm full.		☐	☐	☐	☐
6	My thoughts tend to wander while I am eating.		☐	☐	☐	☐

7	When I'm eating one of my favorite foods, I don't recognize when I've had enough.		☐	☐	☐	☐
8	I notice when just going into a movie theater makes me want to eat candy or popcorn.	☐ I never eat candy or popcorn	☐	☐	☐	☐
9	If it doesn't cost much more, I get the larger size food or drink regardless of how hungry I feel.		☐	☐	☐	☐
10	I notice when there are subtle flavors in the foods I eat.		☐	☐	☐	☐
11	If there are leftovers that I like, I take a second helping even though I'm full.		☐	☐	☐	☐
12	When eating a pleasant meal, I notice if it makes me feel relaxed		☐	☐	☐	☐
13	I snack without noticing that I am eating.		☐	☐	☐	☐
14	When I eat a big meal, I notice if it makes me feel heavy or sluggish.		☐	☐	☐	☐
15	I stop eating when I'm full even when eating something I love.		☐	☐	☐	☐
16	I appreciate the way my food looks on my plate.		☐	☐	☐	☐
17	When I'm feeling stressed at work, I'll go find something to eat.	☐ I don't work	☐	☐	☐	☐
18	If there's good food at a party, I'll continue eating even after I'm full.		☐	☐	☐	☐
19	When I'm sad, I eat to feel better.		☐	☐	☐	☐
20	I notice when foods and drinks are too sweet.		☐	☐	☐	☐
21	Before I eat I take a moment to appreciate the colors and smells of my food.		☐	☐	☐	☐
22	I taste every bite of food that I eat.		☐	☐	☐	☐
23	I recognize when I'm eating and not hungry.	☐ I never eat when I'm not hungry	☐	☐	☐	☐
24	I notice when I'm eating from a dish of candy just because it's there.		☐	☐	☐	☐
25	When I'm at a restaurant, I can tell when the portion I've been served is too large for me.		☐	☐	☐	☐
26	I notice when the food I eat affects my emotional state.		☐	☐	☐	☐
27	I have trouble not eating ice cream, cookies, or chips if they're around the house.		☐	☐	☐	☐
28	I think about things I need to do while I am eating.		☐	☐	☐	☐

SECTION C

Physical Activity

Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person.

Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, study/training, household chores, harvesting food/crops, fishing or hunting for food, seeking employment. *[Insert other examples if needed]*. In answering the following questions 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate.

	Questions	Response
Activity at work		
1	Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *[carrying or lifting heavy loads, digging or construction work]* for at least 10 minutes continuously?	Yes 1 No 2 *If No, go to P 4*
2	In a typical week, on how many days do you do vigorous-intensity activities as part of your work?	Number of days ⌊__⌋
3	How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins
4	Does your work involve moderate-intensity activity that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads]* for at least 10 minutes continuously?	Yes 1 No 2 *If No, go to P 7*
5	In a typical week, on how many days do you do moderate-intensity activities as part of your work?	Number of days ⌊__⌋
6	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins
Travel to and from places		
The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship.		
7	Do you walk or use a bicycle (*pedal cycle*) for at least 10 minutes continuously to get to and from places?	Yes 1 No 2 *If No, go to P 10*

8	In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places?	Number of days ⌊__⌋
9	How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins
Recreational activities		
The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure), [insert relevant terms].		
10	Do you do any vigorous-intensity sports, fitness or recreational (*leisure*) activities that cause large increases in breathing or heart rate like [*running or football,]* for at least 10 minutes continuously?	Yes 1 No 2 *If No, go to P 13*
11	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (*leisure*) activities?	Number of days ⌊__⌋
12	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours: minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins
13	Do you do any moderate-intensity sports, fitness or recreational *(leisure)* activities that causes a small increase in breathing or heart rate such as brisk walking, *cycling, swimming, volleyball* for at least 10 minutes continuously?	Yes 1 No 2 *If No, go to P16*
14	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (*leisure*) activities?	Number of days ⌊__⌋
15	How much time do you spend doing moderate-intensity sports, fitness or recreational (*leisure*) activities on a typical day?	Hours: minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs mins
Sedentary behaviour		
The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent [sitting at a desk, sitting with friends, travelling in car, bus, train, reading, playing cards or watching television], but do not include time spent sleeping.		
16	How much time do you usually spend sitting or reclining on a typical day?	Hours: minutes ⌊__⌋⌊__⌋ : ⌊__⌋⌊__⌋ hrs min s

SECTION D

Instruction: Please read each statement and select from the multiple-choice options the answer that indicates the frequency with which you find yourself feeling or experiencing what is being described in the statements below.

NO	ITEMS	4	3	2	1
1	When I smell a delicious food, I find it very difficult to keep from eating, even if I have just finished a meal.	Definitely true	Mostly true	Mostly false	Definitely false
2	I deliberately take small helpings as a means of controlling my weight.	Definitely true	Mostly true	Mostly false	Definitely false
3	When I feel anxious, I find myself eating.	Definitely true	Mostly true	Mostly false	Definitely false
4	Sometimes when I start eating, I just can't seem to stop.	Definitely true	Mostly true	Mostly false	Definitely false
5	Being with someone who is eating often makes me hungry enough to eat also.	Definitely true	Mostly true	Mostly false	Definitely false
6	When I feel blue, I often overeat.	Definitely true	Mostly true	Mostly false	Definitely false
7	When I see a real delicacy, I often get so hungry that I have to eat right away.	Definitely true	Mostly true	Mostly false	Definitely false
8	I get so hungry that my stomach often seems like a bottomless pit.	Definitely true	Mostly true	Mostly false	Definitely false
9	I am always hungry so it is hard for me to stop eating before I finish the food on my plate.	Definitely true	Mostly true	Mostly false	Definitely false
10	When I feel lonely, I console myself by eating.	Definitely true	Mostly true	Mostly false	Definitely false
11	I consciously hold back at meals in order not to weight gain.	Definitely true	Mostly true	Mostly false	Definitely false
12	I do not eat some foods because they make me fat.	Definitely true	Mostly true	Mostly false	Definitely false
13	I am always hungry enough to eat at any time.	Definitely true	Mostly true	Mostly false	Definitely false
		1	2	3	4
14	How often do you feel hungry?	Only at meal times	sometimes between meals	often between meals	almost always
15	How frequently do you avoid "stocking up" on tempting foods?	Almost never	seldom	moderately likely	almost always
16	How likely are you to consciously eat less than you want?	Unlikely	slightly likely	moderately likely	very likely
17	Do you go on eating binges though you are not hungry?	Never	rarely	sometimes	at least once a week
18	On a scale of 1 to 8, where 1 means no restraint in eating (eating whatever you want, whenever you want it) and 8 means total restraint (constantly limiting food intake and never "giving in"), what number would you give yourself?	Answer: _____			

6

SECTION E

The next 11 questions ask about food you ate or drank during the past 7 days. Think about all the meals and snacks you had from the time you got up until you went to bed. Be sure to include food you ate at home, at university, at college, at restaurants, or anywhere else.

1 During the past 7 days, how many times did you drink 100% fruit juices such as orange juice, apple juice, or grape juice? (Do not count punch, sports drinks, or other fruit-flavored drinks.)

A. I did not drink 100% fruit juice during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

2 During the past 7 days, how many times did you eat fruit? (Do not count fruit juice.)

A. I did not eat fruit during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

3 During the past 7 days, how many times did you eat bread, rice, mi, or mihun?

A. I did not eat bread, rice, mi, or mihun during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

4 During the past 7 days, how many times did you eat meat or chicken?

A. I did not eat meat or chicken during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

5 During the past 7 days, how many times did you eat fish?

A. I did not eat fish during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

6 During the past 7 days, how many times did you eat vegetables?

A. I did not eat vegetables during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

7 During the past 7 days, how many times did you eat legumes (e.g. lentils, peanuts, peas, beans)?

A. I did not eat legumes during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

8 During the past 7 days, how many times did you drink a can, bottle, or glass of soft drink, such as Coke, Pepsi, or Sprite? (Do not count sports drink)

A. I did not drink soft drinks during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

9 During the past 7 days, how many times did you drink a can, bottle, or glass of a sports drink such as RedBull, 100Plus Isotonic Drink, Revive, Power Root, Isomax or Livita?

A. I did not drink sports drinks during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day

10 During the past 7 days, how many times did you drink a bottle or glass of plain water? (Count tap, bottled, and unflavored sparkling water.)

A. I did not drink water during the past 7 days
B. 1 to 3 glasses during the past 7 days
C. 4 to 6 glasses during the past 7 days
D. 1 glass per day
E. 2 glasses per day
F. 3 glasses per day
G. 4 or more glasses per day

11 During the past 7 days, how many glasses of milk did you drink? (Count the milk you drank in a glass or cup, from a carton, or with cereal.)

A. I did not drink milk during the past 7 days
B. 1 to 3 glasses during the past 7 days
C. 4 to 6 glasses during the past 7 days
D. 1 glass per day
E. 2 glasses per day
F. 3 glasses per day
G. 4 or more glasses per day

SECTION F

Instruction: Please read each statement and tick (√) one answer only in the space provided below which indicates how much the statement applied to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:
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

NO	ITEMS	0	1	2	3
1	I found it hard to wind down				
2	I was aware of dryness of my mouth				
3	I couldn't seem to experience any positive feeling at all				
4	I experienced breathing difficulty (eg, 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 over-react to situations				
7	I experienced trembling (eg, 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 down-hearted 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 (eg, 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 G

1 = Never 2 = Seldom 3 = Sometimes 4 = Often 5 = Always

NO	ITEMS	1	2	3	4	5
1	I respect my body					
2	I feel good about my body					
3	I feel that my body has at least some good qualities					
4	I take a positive attitude towards my body					
5	I am attentive to my body's needs					
6	I feel love for my body					
7	I appreciate the different and unique characteristics of my body					
8	My behavior reveals my positive attitude toward my body; for example, I hold my head high and smile					
9	I am comfortable in my body					
10	I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/actors)					

SECTION H

1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Always

NO	ITEMS	1	2	3	4	5
1	When I fail at something important to me I become consumed by feelings of inadequacy					
2	I try to be understanding and patient towards those aspects of my personality I don't like					

3	When something painful happens I try to take a balanced view of the situation					
4	When I'm feeling down, I tend to feel like most other people are probably happier than I am					
5	I try to see my failings as part of the human condition					
6	When I'm going through a very hard time, I give myself the caring and tenderness I need					
7	When something upsets me I try to keep my emotions in balance					
8	When I fail at something that's important to me, I tend to feel alone in my failure					
9	When I'm feeling down I tend to obsess and fixate on everything that's wrong					
10	When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people					
11	I'm disapproving and judgmental about my own flaws and inadequacies					
12	I'm intolerant and impatient towards those aspects of my personality I don't like					

SECTION I

Anthropometry Measurements (Fill by researcher)

Measurement	Reading 1	Reading 2	Average
Weight (kg)			
Height (m)			
Body Mass Index (kg/m^2)			
Body Fat Percentage (%)			
Waist circumference (cm)			

END OF QUESTIONNAIRE
THANK YOU FOR YOUR PARTICIPATION AND COOPERATION