



UNIVERSITI PUTRA MALAYSIA

***FACTORS ASSOCIATED WITH BINGE EATING BEHAVIOR AMONG
UNDERGRADUATE STUDENTS IN UNIVERSITI PUTRA MALAYSIA***

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BY
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of Science (Nutrition and Community Health) from the Faculty of Medicine and Health
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ABSTRACT

FACTORS ASSOCIATED WITH BINGE EATING BEHAVIOR AMONG UNDERGRADUATE STUDENTS IN UNIVERSITI PUTRA MALAYSIA

Nor Lailatul Hidayah binti Agus Salim

Binge eating behavior is an abnormal eating behavior that characterized by eating rapidly large amount of food, continuously eating in the absence of hunger until feeling uncomfortably full, eating alone and secretly due to feeling of embarrassment. Binge eating behavior is commonly reported among university students. However, there is very limited study on binge eating among university students in the local context. Thus, this cross-sectional study aimed to determine the factors associated with binge eating behavior among university students. This study included 338 students (31.4% males and 68.6% females) with a mean age of 20.98 ± 1.40 years from three randomly selected faculties in Universiti Putra Malaysia. A self-administered questionnaire consisting of socio-demographic background, binge eating behavior, body image perception, depression, self-esteem, social physique anxiety, physical activity, food preoccupation and dietary restraint were completed by the respondents. Body weight, height, waist circumference and body fat percentage were measured by the researcher. Results showed that 27.2% of the respondents engaged in binge eating behavior, with no sex difference was observed ($\chi^2=2.48, p=0.115$). One in ten of the respondents (12.1%) were underweight, 13.9% were overweight and 11.9% were obese. Some of the respondents (15.4%) were having abdominal obesity and one third of the respondents (34.0%) were having high body fat percentage. Body mass index ($r=0.261, p<0.001$), waist circumference ($r=0.240, p<0.001$), body fat percentage ($r=0.187, p=0.001$), body dissatisfaction ($r=0.247, p<0.001$), depression ($r=0.220, p<0.001$), self-esteem ($r=-0.179, p=0.001$), social physique anxiety ($r=0.282, p<0.001$), frequency of thoughts about food ($r=0.238, p<0.001$), negative emotional valence ($r=0.306, p<0.001$) and dietary restraint ($r=0.344, p<0.001$) were significantly associated with BEB among university students. In conclusion, this study demonstrates that BEB is prevalent among university students. Results suggest the need of nutrition interventions that emphasizing healthy eating behaviors and proper weight management in order to prevent binge eating behavior among university students.

ABSTRAK

FAKTOR BERKAITAN TINGKAH LAKU MAKAN BERLEBIHAN DALAM KALANGAN PELAJAR PRA-SISWAZAH DI UNIVERSITI PUTRA MALAYSIA

Nor Lailatul Hidayah binti Agus Salim

Tingkah laku makan berlebihan merupakan tingkah laku pemakanan tidak normal berdasarkan ciri-ciri berikut: makan dengan laju dalam jumlah yang terlalu banyak, makan secara berterusan walaupun tidak lapar sehingga terlampau kenyang, makan secara bersendirian dan tersembunyi kerana berasa malu. Tingkah laku makan berlebihan sering berlaku dalam kalangan pelajar universiti. Walaubagaimanapun, kajian mengenai tingkah laku makan secara berlebihan dalam kalangan pelajar universiti tempatan amat terhad. Oleh itu, kajian keratan rentas ini bertujuan untuk mengkaji faktor berkaitan tingkah laku makan berlebihan dalam kalangan pelajar universiti. Kajian ini telah disertai oleh seramai 338 orang pelajar (31.4% lelaki dan 68.6% perempuan) dengan purata umur 20.98 tahun ($SD=1.40$) daripada tiga fakulti yang dipilih secara rawak di Universiti Putra Malaysia. Satu set borang kaji selidik yang mengandungi latar belakang sosio-demografik, tingkah laku makan berlebihan, persepsi terhadap tubuh badan, depresi, harga diri, keseimbangan fizikal sosial, aktiviti fizikal, keseronokan makanan dan kekangan makanan telah dilengkapkan oleh responden. Berat badan, tinggi, ukuran lilit pinggang dan peratus lemak badan telah diukur oleh penyelidik. Hasil kajian menunjukkan seramai 27.2% responden mengamalkan tingkah laku makan berlebihan tetapi tiada perbezaan jantina diperhatikan ($\chi^2=2.48$, $p=0.115$). Satu daripada sepuluh responden (12.1%) merupakan kurang berat badan, 13.9% berat badan berlebihan dan 11.9% obes. Seramai 15.4% responden menunjukkan abdominal obes dan satu pertiga (34.0%) menunjukkan peratusan lemak tinggi. Indeks jisim tubuh ($r=0.261$, $p<0.001$), ukur lilit pinggang ($r=0.240$, $p<0.001$), peratus lemak badan ($r=0.187$, $p=0.001$), persepsi terhadap tubuh badan ($r=0.247$, $p<0.001$), depresi ($r=0.220$, $p<0.001$), harga diri ($r=-0.179$, $p=0.001$), keseimbangan fizikal sosial ($r=0.282$, $p<0.001$), kekerapan memikirkan makanan ($r=0.238$, $p<0.001$), emosi negatif ($r=0.306$, $p<0.001$) and kekangan makanan ($r=0.344$, $p<0.001$) menunjukkan hubung kait yang signifikan dengan tingkah laku makanan berlebihan dalam kalangan pelajar universiti. Kesimpulannya, kajian ini menunjukkan bahawa tingkah laku makan berlebihan merupakan masalah dalam kalangan pelajar pra-siswazah. Hasil kajian menyarankan keperluan intervensi pemakanan yang memberi penekanan terhadap tingkah laku pemakanan yang sihat dan pengurusan berat badan yang betul untuk mencegah tingkah laku makan berlebihan dalam kalangan pelajar universiti.

CHAPTER 1

INTRODUCTION

1.1. BACKGROUND

Binge eating behavior is an abnormal eating behavior due to losing control of an individual on type and amount of food taken (Goldschmidt, Tanofsky-Kraff & Wilfley, 2011). People with binge eating often eat an uncontrollable, unambiguously large amount of food during the binges (Bodell et al., 2018; Memon et al., 2012). This behavior can be observed through several characteristics, which are rapidly eating large amount of food, continuously eating even no longer feeling hungry until feeling uncomfortably full, eating alone and secretly due to feeling of embarrassment (American Psychiatric Association, 2013). The persistent and recurrent episode of these behaviors in the absence of the compensatory behavior such as excessive exercise and vomiting is diagnosed as Binge Eating Disorder, which is the latter stage that is more serious (Diane & Kamila, 2013).

Binge eating behavior is differed from binge eating disorder because binge eating disorder is recognized as a psychiatric disorder (Wever et al., 2018). Meanwhile, recurrent binge eating behavior is a key of behavioral symptom and diagnostic marker that defining binge eating disorder which can lead to a variety of mental and physical health problems (American Psychiatric Association, 2013; Dugue et al., 2016; Kales, 1990). Hence, binge eating behavior is not as severe as binge eating disorder. Binge eating behavior is

observed mostly among individual who has strong desire to lose weight or to prevent weight gain.

In the United States, binge eating behavior is a serious mental-related problem among young adults because the prevalence of binge eating behavior is higher compared to anorexia nervosa, bulimia nervosa and binge eating disorder (Hudson et al., 2007). Moreover, binge eating behavior shows increasing trend and becomes more prevalent from adolescents towards young adulthood in both males and females (Neumark-Sztainer et al., 2011). Female university students have higher engagement in this behavior compared to males (Laska et al., 2011; Lipson & Sonnevile, 2017). However, there is only one study on binge eating behavior among university students in the local context (Thu et al., 2019), which focused on nutrition factors only. Hence, study on binge eating behavior among Malaysian university students is warranted.

Binge eating behavior is common among university students who are young adults because they always reported practicing unhealthy weight change due to poor dietary practices (Nelson et al., 2008). Additionally, university environment has a high tendency for students to engage with binge eating behavior as a response to university stressful life (Goldschmidt et al., 2014; Nicole & Kyle, 2018). Most of the university students are having a hard time to adjust with new environment and encounter with new challenges in university life especially among those in their sophomore year (Barker & Galambos, 2007). Besides, students are also facing a stressful time in university due to academic demands especially during final year, thus, they are more likely to binge eat and lose control of food (Ganasegaran et al., 2012; Shamsuddin et al., 2013; Sulkowski, Dempsey & Dempsey, 2011).

Kelly-Weeder et al. (2011) found that 48% of university students from private university in northeastern United States reported to have binge eating behavior. Nicoli and Liberatore Junior (2011) highlighted the presence of binge eating behavior among undergraduate students in the city of Sao Jose do Rio Preto, Brazil in which 12.9% showed binge eating behavior, 9.2% being moderate and 3.7% were severe. Another study conducted by Lazarevich et al. (2013) revealed that 10% out of 1122 Mexican university students had high prevalence of binge eating behavior which were overeating and difficult to stop eating. These findings show that university students have high tendency to develop binge eating behavior.

Binge eating behavior becomes a concern in public health as it has significant implications in terms of long-term weight gain, psychological disorder, especially depression (Mathes et al., 2009; Sonnevile et al., 2013; Tanofsky-Kraff et al., 2009; Tanofsky-Kraff et al., 2011). Besides, it has been reported to cause several medical implications such as hypertension, dyslipidemia and Type 2 diabetes (Hudson et al., 2010). The development of this behavior during young adulthood can have serious impairment in terms of mental health and become an important marker of poor psychosocial functioning beyond depressive symptoms (Mason & Heron, 2016; Rosenbaum & White, 2013). Thus, by studying binge eating behavior among university students, it can help the researchers to identify possible factors that are associated with binge eating behavior in order to prevent this behavior among university students.

1.2. PROBLEM STATEMENT

Binge eating behavior and sense out of control when it comes to food can occur among childhood and common in adolescents and young adults (American Psychiatric Association, 2013). The development of healthy eating behavior is important as disordered eating such as binge eating behavior has been viewed to develop emotional problems and required to receive treatments including medications and mental health specialty sectors (Hudson et al., 2007). Besides, individual with binge eating behavior has high risk for psychological impairments, notably psychiatric disorder such as anxiety disorder, mood disorder and depressive disorder which can impair quality of life as well as social interactions (Lazarevich, et al., 2013; Rosenbaum & White, 2013). According to a 6-10 year prospective cohort study, participants with binge eating behavior developed high depressive symptoms, became overweight/obese or started to use drugs, including marijuana and frequently binged drinking (Sonneville et al., 2013). Besides, binge eating behavior has high risk to develop metabolic syndrome such as dyslipidemia, hypertension and Type 2 Diabetes Mellitus (Hudson et al., 2010). Therefore, it is important to prevent this behavior among university students.

Previous studies on binge eating behavior with sex demonstrated inconsistent findings. A study conducted by Memon et al. (2012) showed significant sex differences for binge eating behavior, in which female (25.4%) was higher in the prevalence of binge eating behavior compared to male (12.9%). However, studies conducted by Lofrano-Prado (2015) and Schulte (2016) showed that there was no sex difference in binge eating behavior. Hence, study on the association between sex and binge eating behavior is warranted. Moreover, studies on the associations between psychological factors and

behavioral factors showed inconsistent findings (Andres & Saldana, 2014; Barber, Ivezaj & Barnes, 2018; Bittencourt, et al., 2012; Davis, 2013; Hafizah, 2015; Schulte, 2016; Vancamfort, et al., 2014; William et al., 2017). Thus, more studies need to be conducted to confirm the findings. In addition, the only study on binge eating behavior among university students in Malaysia focused on the association of a single factor which was nutritional factors and binge eating behavior (Thu et al., 2019).

Overall, this study aimed to determine the associations between personal factors, psychological factors and behavioral factors with binge eating behavior among undergraduate students in UPM. The research question needed to be answered in this study was:

- i. Are personal factors, psychological factors, and behavioral factors associated with binge eating behavior among undergraduate students in UPM?

1.3. SIGNIFICANCE OF THE STUDY

University students have been seen to have tendency in developing binge eating behavior due to various factors. There is limited study in Malaysia on binge eating behavior and its associated factors among university students. Hence, one of the significance of this study is to provide latest and updated information about binge eating behavior among university students in Malaysia. Besides, this study also provides information on the factors associated with binge eating behavior. By understanding the possible factors associated with binge eating behavior, it can help to prevent this behavior from developing into disorder and to promote healthy eating behaviors among students.

This study is able to provide baseline data and can be used as a reference for future research about binge eating behavior particularly among university students in Malaysia. Besides, the findings of this study can be used by health professionals such as nutritionists to plan and conduct intervention programs as initiative to reduce binge eating behavior and to improve eating behaviors of university students.

1.4. RESEARCH OBJECTIVES

1.4.1 GENERAL OBJECTIVE

To determine the factors associated with binge eating behavior among university students in Universiti Putra Malaysia (UPM).

1.4.2 SPECIFIC OBJECTIVES

- i. To examine personal factors (age, sex, ethnicity, accommodation, year of study and body composition), psychological factors (body image perception, depression, self-esteem and social physique anxiety), and behavioral factors (physical activity level, eating behavior, food preoccupation and dietary restraint) among university students in UPM.
- ii. To assess binge eating behavior among university students in UPM.
- iii. To determine the associations between personal factors, psychological factors, and behavioral factors with binge eating behavior among university students in UPM.

1.5. RESEARCH HYPOTHESIS

There are associations between personal factors, psychological factors, and behavioral factors with binge eating behavior among university students in Universiti Putra Malaysia.

1.6. CONCEPTUAL FRAMEWORK

This study aims to determine the associations between personal factors, psychological factors and lifestyle factors with binge eating behavior among university students in Universiti Putra Malaysia. Based on Figure 1.1, the dependent variable of this study was the binge eating behavior among university students. Meanwhile, independent variables were personal factors, psychological factors and behavioral factors.

Binge eating behavior was found to be higher among young adults including university students group aged between 19 until 22 compared to adolescents and childhood in both males and females (Sonnevile et al., 2013). Several previous studies showed that females had higher engagement with binge eating behavior compared to males (Lee-Winn et al., 2016; Memon, 2012; Saules et al., 2009; Sonnevile et al., 2013). Furthermore, binge eating behavior was highly reported among first year university students due to the adjustment with new environment during first year of study as well as final year students due to stressful university lifestyle (Barker & Galambos, 2007; Kelly-Weeder et al., 2011; Philips, et al., 2016; Shamsuddin et al., 2013; Striegel-Moore et al., 1989; Sulkowski, Dempsy & Dempsy, 2011). Additionally, university students were found to be three times more likely to develop binge eating behavior when they were living away from home and living independently either in college residence and own

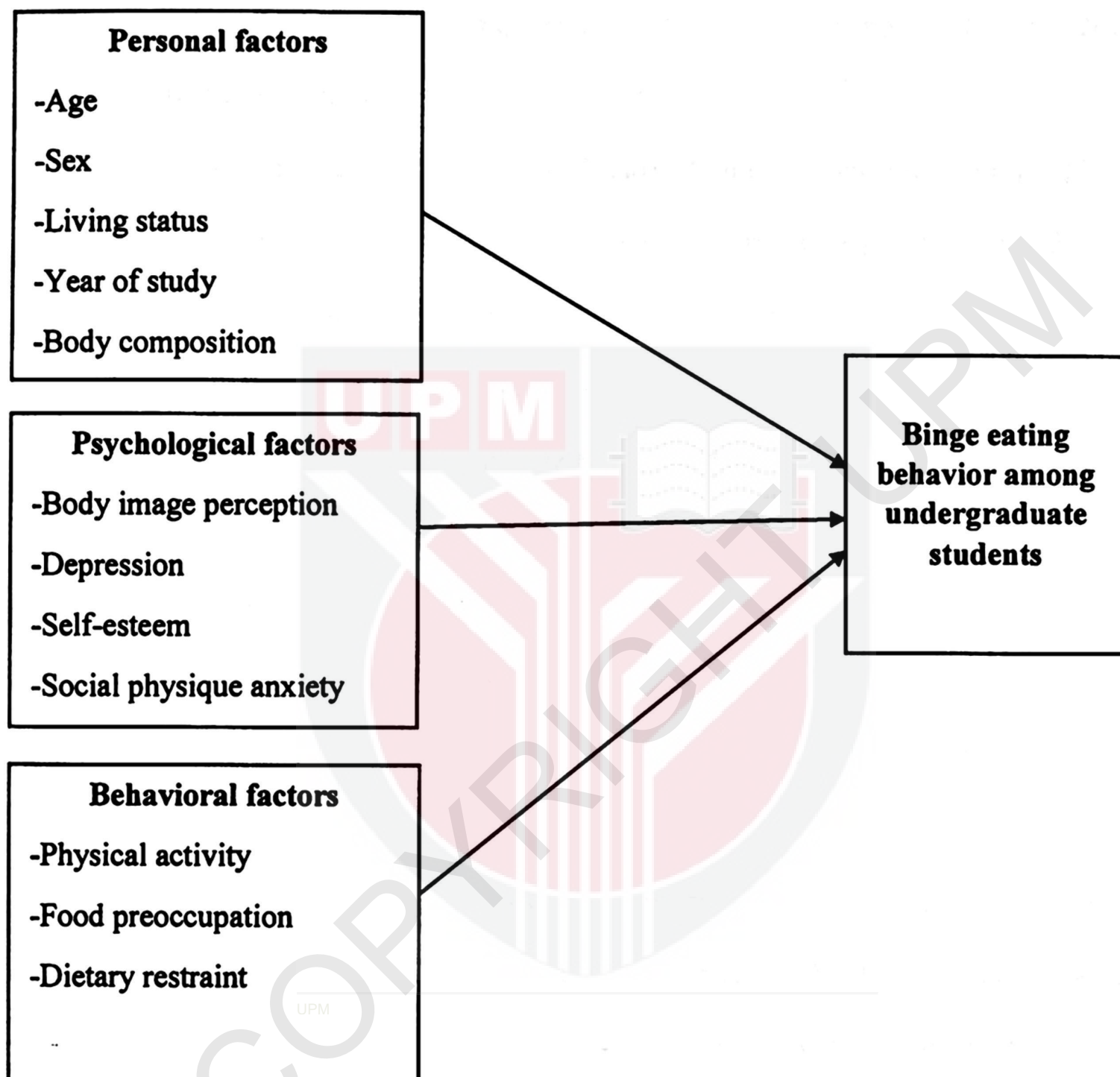


Figure 1.1: Conceptual framework of this study

apartment (Barker & Galambos, 2007). Overweight or obese individuals demonstrated unhealthy eating behavior including binge eating (Barber, Ivezaj & Barnes, 2018; Higgins, 2013; Lundgren, 2013).

In term of psychological factors, Duarte, Pinto-Gouveia and Ferreira (2011) highlighted the positive correlation between negative body image perceptions with binge eating behavior. Individuals who dissatisfied their body image developed persistent engagement with binge eating behavior (Lofrano-Prado et al., 2015). On the other hand, Jang and Kang (2011) reported a positive correlation between depression and binge eating behavior. Furthermore, low self-esteem level also found to be associated with binge eating behavior (Andrea et al., 2016). Social physique anxiety is a feeling of anxious and fear about others' negative evaluation on their appearance. Studies found that individuals with social physique anxiety can develop binge eating behavior (Hart et al., 2008; Levinson et al., 2013).

Behavioral factors such as physical activity level, food preoccupation and dietary restraint also important factors that were found to be associated binge eating behavior. Low engagement with physical activity and dietary restraint can trigger overeating, which can lead to binge eating behavior (Andres & Saldana, 2014). Besides, thought that preoccupied with food has been seen to have significant association with binge eating behavior (Chao, Grilo & Sinha, 2016).

CHAPTER 2

LITERATURE REVIEW

2.1. OVERVIEW OF BINGE EATING BEHAVIOR

According to the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition, binge eating behavior can be explained by the consumption of food that abnormally larger compared to the most people would eat in a specific period of time due to lose control towards overeating behaviors until feeling uncomfortably full (American Psychiatric Association, 2013). Binge eating is associated with excess food intake and can contribute to the risk of gaining weight or obesity (Bertoli et al., 2015). This is because individuals with binge eating behavior will continuously eat the food even they are not feeling hungry and they can consume 1500 up to 20 000 calories on binge period, in which the food contained significantly higher fat and lower protein (Agras & Telch, 1998; Stunkard, 1959). Besides, long-term engagement with binge eating behavior can lead to many health implications including metabolic syndromes such as dyslipidemia, hypertension and diabetes mellitus (Hudson et al., 2010). In addition, study found that individual who was practicing binge eating behavior for at least 6 years had high tendency to becoming a drug user, especially marijuana and also bingeing in drinking alcohol (Sonneville, et al., 2013). Binge eating behavior has been recognized as a hallmark for other eating disorders such as bulimia nervosa (BN) and binge eating disorder (BED) as well as one the characteristics for anorexia nervosa (AN) (Wolff, et al., 2000).

According to a prevalence study done by Bertoli et al. (2015), 17% of the adults aged 18-81 years old in Milan, Italy showed binge eating behaviors and it was higher among women compared to men. Another study conducted by Kessler et al. (2013) showed that 1.9% of adults aged 18 years and above had binge eating and slightly higher compared to bulimia nervosa. Adults especially university students have shown to be more prone to experience binge eating behaviors. Besides, a study done by Ribeiro, Conceicao and Machado (2014) in north Portugal found that 9.6% of college students was found for having binge eating. The only study done in Malaysia on the prevalence of binge eating behavior among university students found that 10% of the students engaged in this unhealthy eating behavior (Thu et al., 2019). Several factors were found to have association with binge eating behavior among undergraduate students which are personal factors, psychological factors and behavioral factors.

2.2 PERSONAL FACTORS

2.2.1 Age and Binge Eating Behavior

A 10-year longitudinal study conducted by Neumark-Sztainer et al. (2011) among 2287 participants in Minnesota showed that there was a significant increase in the prevalence of binge eating behavior from middle adolescents to middle young adults from 9.9% to 14.1% in female participants ($p=0.012$) and from 3.0% to 5.9% in male participants ($p=0.020$). Another 10-year longitudinal study done by Sonnevile et al. (2013) on 16 882 adolescents and young adults living in the United States found that engagement with binge eating behavior was increasing with age from 0.5% at age 9 years old to 3.6% at age 24 years old. Another study done by Bodell et al. (2018) among 122

adolescent girls in Pittsburgh showed that the prevalence of binge eating behavior was higher among participants aged 18 years old (5.7%) compared to participants aged 16 years old (3.3%). Besides, a study done by Memon et al. (2012) among 495 medical students in Pakistan found that higher prevalence of binge eating behavior was reported among students aged 18-21 years old (65.65%) compared to age group 22-25 years old (34.34%) ($p=0.245$). In contrast, a study conducted by Vitolo, Bartolini and Horto among 578 university students in Sao Leopoldo, Brazil showed that there was no significant association between age and binge eating behavior ($p=0.499$).

2.2.2 Sex and Binge Eating Behavior

The prevalence of binge eating behavior is different between male and female. According to a previous study conducted by Wolff and Wittrock (1998) among 1642 university students showed that the prevalence of binge eating behavior was higher among female students (9.0%) compared to male students (5.2%). Furthermore, a study conducted by Memon et al. (2012) among medical students from three renowned medical colleges in Karachi showed that there was a significant difference ($p=0.011$) of binge eating behavior between sex, in which females had higher prevalence of binge eating behavior (87.9%) compared to males (12.1%).

In contrast, a study done by Lofrano-Prado et al. (2015) found no significant sex difference for binge eating behavior among 408 health sciences students in northeast Brazil. However, female students still presented high binge eating behavior compared to males. Similarly, a study done by Schulte (2016) among 254 youths in United Emirate Arab showed that female youths highly engaged with binge eating behavior compared to

male youths. However, the study did not show significant difference of binge eating behavior between female and male ($p>0.05$). Another study conducted by Thu et al. (2019) among 170 Malaysian university students also showed no significant association between sex and binge eating behavior.

2.2.3 Living Status and Binge Eating Behavior

The transition of young people from school life to university life is a critical period in which will change their living arrangement from living with parents to living away from home; thus, can implicate their lifestyle factors including eating behaviors (Brevard & Ricketts, 1996). Living status of university students can be divided into living with family, living in hostel or with friends, and living alone (Shamsudin et al., 2013).

A study conducted by Eisenberg, et al. (2007) showed that 46.9% and 44.8% out of 1181 undergraduate students in Midwestern public university living off-campus (not with parents/guardian) and living in campus residence hall, respectively. Besides, a study done by Shamsuddin et al. (2013) showed that majority (81.0%) of university students from public universities in Klang Valley, Malaysia lived in hostels or with friends. These findings showed that most university students tend to live away from home after entering university life.

A study done by Barker and Galambos (2007) among 101 female university students in Canada found that binge eating behavior was significantly three times higher among university students who lived away from home ($p<0.05$). This is because they need to do adjustment with new living environment which gives them hard time that can trigger the binge eating behavior as a coping method (Barker & Galambos, 2007). However, there

is very limited study on the association between living status and binge eating behavior. Thus, further investigation on this association is required in order to provide more updated data.

2.2.4 Year of Study and Binge Eating Behavior

There are very few studies investigating the association between year of study and binge eating behavior. A study conducted by Sepulveda, Carrobbles and Gandarillas (2008) among 2551 of first and fourth year students at Autonomous University of Madrid found that the prevalence of binge eating behavior was higher among fourth year female students (22.8%) compared to first year female students (18.0%). Another study done by Yu and Tan (2016) among 961 college students aged 18-25 years old in Florida, United States also showed that students in junior/senior years reported slightly higher engagement with binge eating behavior (10.6%) compared to students in freshman/sophomore years (8.8%). This is due to stressful university life and high demand for good academic performance for graduation (Kelly-Weeder et al., 2011; Philips, et al., 2016; Shamsuddin et al., 2013; Striegel-Moore et al., 1989).

2.2.5 Body Composition and Binge Eating Behavior

Body weight status can be classified into underweight, normal and overweight/obese. A study from Universiti Sains Malaysia (USM) done by Huda and Ruzita (2010) showed that 9.6% of students were overweight and 1.8% were obese. Besides, a study done by Khan et al. (2011) showed that 13.5% of 460 students from Universiti Teknologi Mara (UiTM), Puncak Alam Campus were overweight and 2.8%

were in obese Class I. Another study conducted by Gan et al. (2011) among Malaysian university students in the Klang Valley showed that 14.0% of the male university students and 12.3% of the female university students were overweight or obese. Besides, a study done by Gan, Chin and Law (2019) among 270 Malaysian university students in Selangor showed that 25.0% of the students were overweight and obese, 14.5% were underweight and 20.1% were having abdominal obesity.

Several studies have shown the association between body weight status and binge eating behavior (Barber, Ivezaj, & Barnes, 2018; Lundgren et al., 2010; Rosenbaum & White, 2015). The prevalence of binge eating behavior was significantly increasing with the level of obesity; 76.3% for obese I, 80.2% for obese II and 83% for obese III (Higgins, 2013). A study conducted by Lundgren et al. (2010) among overweight/obese individuals with a mean BMI of 37.2 kgm⁻² showed that 14.7% of them reported to have at least one criteria of binge eating and 5.9% met all the criteria of binge eating. Another study done by Barber et al. (2018) among 97 adults aged 18 years old and above in the United States found that high BMI was reported among individuals with binge eating behavior compared to non-binge eating individuals. Similarly, a study conducted by Rosenbaum and White (2015) among adults aged 18 years old and above showed that there was a significant association between BMI and binge eating behavior ($r=0.32$, $p<0.001$). Likewise, a recent study done by Thu et al. (2019) among 170 Malaysian students showed that BMI was significantly correlated with binge eating behavior ($r=0.204$, $p<0.01$).

Besides, waist circumference also showed a significant correlation ($p<0.001$) with binge eating behavior among university students (Succuro et al., 2015). Furthermore, a study done by Adamus-Leach et al. (2012) among adults aged 25 years old and above in

the United States showed that there was a significant association between body fat percentage and binge eating behavior ($r=0.305$, $p<0.01$). However, a study by Berner et al. (2015) reported no significant association between body fat percentage and loss control of food ($r=0.04$, $p>0.05$).

2.3. PSYCHOLOGICAL FACTORS

2.3.1 Body Image Perception and Binge Eating Behavior

Body image dissatisfaction can be referred as the feeling of shame about body's appearance which can cause body image concealment and avoidance of social interactions and highly associated with binge eating behavior (Duarte, Pinto-Gouveia & Ferreira, 2014). Body image dissatisfaction was predictive of persistent engagement in regular binge eating among college students and it can contribute to the highest risk of binge eating which was by 25-fold followed by anorexia nervosa (22-fold) and bulimia nervosa (18-fold) (Dakanalis et al., 2016; Lofrano-Prado, 2015).

A previous study conducted by Costa et al. (2010) among 935 university students in Florianopolis, southern Brazil found that 34.2% of students with abnormal eating behaviors were dissatisfied with their body image. Furthermore, results showed that body image dissatisfaction contributed 13.5 times higher in the prevalence of abnormal eating behaviors compared to the students who were satisfied with their body image. A study done by Lofrano-Prado (2015) among 408 health sciences college students in northeast of Brazil showed that body image dissatisfaction was positively correlated with binge eating behavior ($r=0.728$, $p<0.05$). A recent study conducted by Kelly, Cotter and Guidinger (2018) among 1114 participants aged 18-30 years old in the United States

revealed a significant difference of body image concern between group with no-disordered eating and binge eating. This explains that group with binge eating behavior reported higher concern on their body image compared to group with normal eating behavior.

2.3.2 Self-Esteem Level and Binge Eating Behavior

Self-esteem is an individual's feeling of self-worth as a person, overall evaluation on one-self and the feeling of self-satisfaction (Ghaljahi et al., 2018; Soenens, Berzonsky & Papini, 2016). Self-esteem is an important self-component that can affect performance of an individual in most aspects of life, including health and positive thinking (Ghaljahi et al., 2018). This is because self-esteem can carry good task performance, can be more attractive, have better social relationship and able to make positive impressions on other people (Arshad, Zaidi & Mahmood, 2015). In addition, self-esteem is an important element especially for university students that enables them to well-adjusted with new environment and university life (Bettencourt et al., 1999).

According to a study conducted by Mustafa, Fanaj and Melonashi (2015) among 125 students from Kosovo and Albania showed that 1.6% of students from Kosovo and 6.3% from Albania reported low self-esteem level. This is because university students are often uncertain with their abilities particularly in achieving good academic performance and establishing new social relationship which cause them to have low self-esteem (Dwyer & Cummings, 2001; Tao et al., 2000). Self-esteem level is another component of psychological factors that has been viewed to have an association with binge eating

behavior. This is because self-esteem can become the predictor of binge eating towards adulthood.

According to a study conducted by Andrea et al. (2016), self-esteem significantly predicted binge eating behavior for both males and females from early adolescence until middle adulthood. Besides, individuals with binge eating behavior showed low self-esteem for both boys and girls (Kelly, Vimalakanthan & Carter, 2014; Mitchel et al., 2015; Sehm & Warschburger, 2016). However, there is a very limited study available on the association between self-esteem and binge eating behavior. Therefore, further study on this association is needed.

2.3.3 Social Physique Anxiety and Binge Eating Behavior

Social physique anxiety is a part of the component in psychological variable that reflects an individual's perceived worry or concerns about others' will be evaluating their physique appearance in a certain situation (Hart, Leary & Rejeski, 1989). Physique can be defined as person's body structure including body fat, muscle tone and general body proportions (Hart, Leary & Rejeski, 1989). Besides, social physique anxiety can be defined as a fear of people's negative evaluation of one's appearance (Hart, et al., 2008; Levinson, et al., 2013). This is because this anxiety is a derivative of social anxiety that linearly linked to the responses of the social judgment on someone's physical appearance (Rothberger et al., 2015).

A study conducted by Arabaci (2008) among university students in Turkey showed that female students reported significantly higher score of social physique anxiety (30.0 ± 5.27) compared to male students (27.3 ± 4.14) ($p < 0.001$). This anxiety has been

shown to be linked to psychological and behavioral factors that associated with health including binge eating behavior (Hagger & Stevenson, 2010). Anxiety level is an important component that can be used to understand binge eating behavior and studies showed significant association with binge eating (Ostrovsky et al., 2013; Rosembaum & White, 2015).

A study done by Levinson et al. (2013) on 236 undergraduate students from a Midwestern university and 156 undergraduate students from large university in the Southwestern United States showed that there were significant associations between social physique anxiety with binge eating behavior in both populations ($p < 0.01$). Therefore, social appearance anxiety has been proposed as one of the contributor towards eating disorder (Levinson et al., 2013). Similarly, another study carried out by De Boer et al. (2012) showed that anxiety sensitivity was present among individuals with binge eating behaviors. However, a study done by Ostrovsky et al. (2013) among 231 adults aged 18 years old and above in showed there was no significant association between social physique anxiety and binge eating behavior.

2.3.4 Depression and Binge Eating Behavior

Depression is known to be a negative emotion and feeling that can cause impairment and limit someone's ability to work normally (National Institute of Mental Health, 2017). According to a survey from the National Institute of Mental Health (2017), the prevalence of depression was the highest among adults that aged between 18-25 years old (10.9%) and the highest among females (8.5%) compared to males (4.8%).

Previous studies have shown that depression was associated with binge eating behavior (Duarte, Pinto-Gouveia & Ferreira, 2014; Wolff et al., 2000). According to a study conducted by Wolff et al. (2000) among 40 female university students showed that students that reported binge eating at least once a week were significantly higher in depression level ($p < 0.0001$). This is because by consuming large amount of food during bingeing can reduce the negative moods including depression and give a satisfaction, thus reinforcing the binge eating behavior (Agras & Telch, 1998). Besides, a study done by Duarte et al. (2014) among 329 women university students in Portugal showed that depression was significantly and positively correlated with binge eating behavior ($r = 0.33$, $p < 0.001$). These findings are consistent with a study conducted by Schulte (2016) among 254 male and female undergraduate students in United Arab Emirates demonstrated that depression was positively correlated with binge eating behavior ($r = 0.280$, $p < 0.001$). Besides, a study carried out by Shin and Yi (2014) among students from three universities in South Korea also showed a significant positive correlation between depression and binge eating behavior ($r = 0.43$, $p < 0.001$). Another study done by Saleem et al. (2014) among 350 undergraduate students in the Islamia University of Bahawalpur, Pakistan found that depression was significantly associated with binge eating behavior ($p < 0.001$).

2.4. BEHAVIORAL FACTORS

2.4.1 Physical Activity and Binge Eating Behavior

Binge eating behavior is a compensatory method towards negative feelings such as depression, anger and sadness and physical activity has believed can reduce the urge to engage with binge eating behavior by providing alternative means of managing the

negative feelings (Polivy & Herman, 1993). Physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure (World Health Organisation, 2018). Thus, previous studies have shown implementation of physical activity to cope with binge eating behavior. Pendelton et al. (2002) reported that 68% of binge eaters that received cognitive behavioral therapy combined with exercise had shown a significant improvement in binge frequency.

Physical activity has been viewed to be associated with binge eating behavior as low physical activity level can be seen among women with binge eating behaviors during young adults and matured adults (Crandall et al., 2011). A study done by Vancamfort et al. (2014) showed that the participants with binge eating behavior scored significantly lower in terms of leisure time physical activity and sports. Besides, exercise capacity is also significantly low among individuals with binge eating after performing 6-Minute Walking Test. Low participation in weekly physical activity can contribute towards the low physical activity capacity that resulted in physical discomfort after doing physical activity especially muscular fatigue and pain (Vancamfort et al., 2014). Another study showed that individual with binge eating behavior was significantly associated with insufficient physical activity (OR 1.290; CI 1.078-1.544, $p=0.005$) (Souza da Silva, et al., 2016).

2.4.2 Food Preoccupation and Binge Eating Behavior

Study on the association between preoccupied with food and binge eating is very limited. Food preoccupation is characterized by being too absorbed or intense desired for food and can lead to obesity-promoting eating behaviors (Tan et al., 2016). A study

conducted by Williams et al. (2017) among undergraduate students from southern United States found that food preoccupation was positively associated with binge eating behavior ($r=0.53, p<0.001$). Davis (2013) explained that individuals who met the criteria for Yales Food Addiction Scale was significantly co-morbid with binge eating. This is because binge eating usually associated with emotional overeating and preoccupation thoughts with food (Davis, 2013). Another study carried out by Verzijl, Ahlich, Schlauch and Rancourt (2018) demonstrated greater food restrained associated significantly with high food preoccupation, in which high food preoccupation was associated with frequent uncontrolled and emotional eating. This association explained restriction on food will activate food craving and negative food-related cognition thus will increase binge eating behavior (Mason & Lewis, 2015; Verzijl, Ahlich, Schlauch & Rancourt, 2018).

2.4.3 Dietary Restraint and Binge Eating Behavior

Dietary restraint is a conscious attempt to restrict food intake in order to lose or maintain weight (Linardon, 2018). Dietary restraint is one of the behavior that can make an individual more vulnerable to binge eating behavior due to the body's deficient in food thus, lead to overeating in order to compensate the food deprivation (Polivy & Herman, 1993).

According to a study conducted by Andres and Saldana (2014), individuals with dietary restriction usually reported to have binge eating behavior. The study also showed that dietary restraint was a well-establish risk factor of binge eating because those who were dieting and restricting their food intake had high tendency to engage with binge eating behavior. This is because diet restriction can trigger overeating which can lead to

binge eating behavior (Andres & Saldana, 2014). Strict dietary rules is not easy to sustain and has high tendency to break the rules in which can induce all-or none reaction that can lead to binge eating behavior (Fairburn, 2008; Herman & Mack, 1975). This is because failure in dietary restraint which is by breaking the rules can promote negative feeling that can cause the individual to engage with binge eating behavior as compensatory method of coping with the negative feeling (Stice, 2001).

A study conducted by Zunker, et al. (2011) among participants aged 18 years old and above in North Dakota showed that individuals with dietary restraint had the tendency to binge eating. A 10-year longitudinal study conducted among middle and high school students in Minneapolis area showed the onset of binge eating behavior among students who had dieting behavior in both males and females (Goldschmidt, et al., 2012). Besides, university students especially women who just enrolled into first semester of study who reported to restrict their food intake engaged with binge eating behavior (Emery, et al., 2013). Another study done by Woods, Raune and Klump (2010) among undergraduate students from Midwestern university showed that there was a significant positive correlation between restraint eating and binge eating behavior ($r=0.43$, $p<0.01$), in which high level of dietary restraint had greater tendency of practicing binge eating behavior.

CHAPTER 3

METHODOLOGY

3.1. STUDY DESIGN

This was a cross-sectional study aimed to determine the factors associated with binge eating behaviors among undergraduate students in Universiti Putra Malaysia.

3.2. STUDY LOCATION

The study was carried out in Universiti Putra Malaysia (UPM) which is located at Serdang. UPM has been designated as a Research University that committed to the discovery and distribution of knowledge. There are an approximately of 26 000 students enrolled in its 74 bachelor, 42 coursework programmes and 5 research programmes with 265 field of study (Malaysia's Top Most Innovative University, 2017).

3.3. RESPONDENTS

This study was conducted among undergraduate students in UPM at Serdang campus. Participants were selected based on the inclusion and exclusion criteria as stated in Table 3.1.

Table 3.1: Inclusion and exclusion criteria for respondents of this study

Inclusion Criteria	Exclusion Criteria
• Malaysian • Undergraduate students • Aged 18-25 years old • Female or male	• International students • Foundation or postgraduate students • Physical disability • Pregnant students

3.4. SAMPLE SIZE

The sample size for this study was estimated by calculation based on the formula by Hulley, Cummings, Browner, Grader and Newman (2013) as shown below:

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

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

The standard normal deviate for $\alpha = Z_{\alpha} = 1.96$

The standard normal deviate for $\beta = Z_{\beta} = 0.84$

The expected correlation coefficient = r

Table 3.2 shows the sample calculation based on the factors that correlate with binge eating behavior in which the correlation coefficients are obtained from previous studies.

Table 3.2: Sample size calculation

Variable	Correlation, r	Calculation
1. Body image perception/dissatisfaction and binge eating (Hidayah & Syahrul Bariah, 2011)	0.606	$N = \left[\frac{(1.96 + 0.84)^2}{0.703} \right] + 3$ $c = 0.5 * \ln \left[\frac{(1+0.606)}{(1-0.606)} \right] = 0.703$ $\therefore N = 19$
2. Social physique anxiety and binge eating (Mohamadirizi et al., 2015)	0.360	$N = \left[\frac{(1.96 + 0.84)^2}{0.377} \right] + 3$ $c = 0.5 * \ln \left[\frac{(1+0.360)}{(1-0.360)} \right] = 0.377$ $\therefore N = 59$
3. Depression and binge eating (Abdul Manaf, Saravanan & Zuhrah, 2016)	0.410	$N = \left[\frac{(1.96 + 0.84)^2}{0.436} \right] + 3$ $c = 0.5 * \ln \left[\frac{(1+0.410)}{(1-0.410)} \right] = 0.436$ $\therefore N = 45$

Table 3.2: Sample size calculation (cont.)

Variable	Correlation, r	Calculation
4. Body weight status (BMI) and binge eating (Rosenbaum & White, 2015)	0.19	$N = \left[\frac{(1.96 + 0.84)}{0.192} \right]^2 + 3$ $c = 0.5 * \ln \left[\frac{(1+0.19)}{(1-0.19)} \right] = 0.192$ $\therefore N = 216$
5. Food preoccupation and binge eating (Verzijl, et al., 2018)	0.75	$N = \left[\frac{(1.96 + 0.84)}{0.973} \right]^2 + 3$ $c = 0.5 * \ln \left[\frac{(1+0.75)}{(1-0.75)} \right] = 0.973$ $\therefore N = 12$
6. Dietary restraint and binge eating (Linardon, 2018)	0.61	$N = \left[\frac{(1.96 + 0.84)}{0.709} \right]^2 + 3$ $c = 0.5 * \ln \left[\frac{(1+0.61)}{(1-0.61)} \right] = 0.709$ $\therefore N = 19$

The highest number of sample size was selected as the final sample size of this study, which was 216 respondents based on Table 3.2. As shown in Table 3.3, this is the additional adjustment in computing the sample size.

Table 3.3: Additional adjustment in computing the sample size

No.	Criteria	Calculation
1.	Adjust for the estimated sample effect	$N \times \text{DEEF}$ $\text{DEEF} = 1.1, \text{ therefore}$ $N = 216 \times 1.1 = 237.6$
2.	Adjust for the expected response rate	$N / \text{Response rate}$ $\text{Response rate} = 80\% = 0.8$ $(\text{Aday \& Cornelius, 2006})$ therefore, $n = 237.6 / 0.8 = 297$
3.	Adjust for the expected proportion eligible	$N / \text{Proportion eligible}$ $\% \text{Eligible} = 90\%$ $(\text{Aday \& Cornelius, 2006}),$ therefore $n = 297 / 0.9 = 330$

After consideration of design effect, response rate and proportion of eligibility, the final sample size required for this study was 330 respondents.

3.5. SAMPLING DESIGN

As shown in Figure 3.1, multistage sampling method was used in this study. There were 15 faculties in UPM which were divided into three different fields, 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 Human Ecology, Faculty of Medicine and Health Sciences, and Faculty of Engineering. Then, one program was randomly selected from each of the selected faculties. All students in each of the selected program were included in this study (N=617). A total of 338 students agreed to participate in this study and completed the study, yielding a response rate of 54.8%.

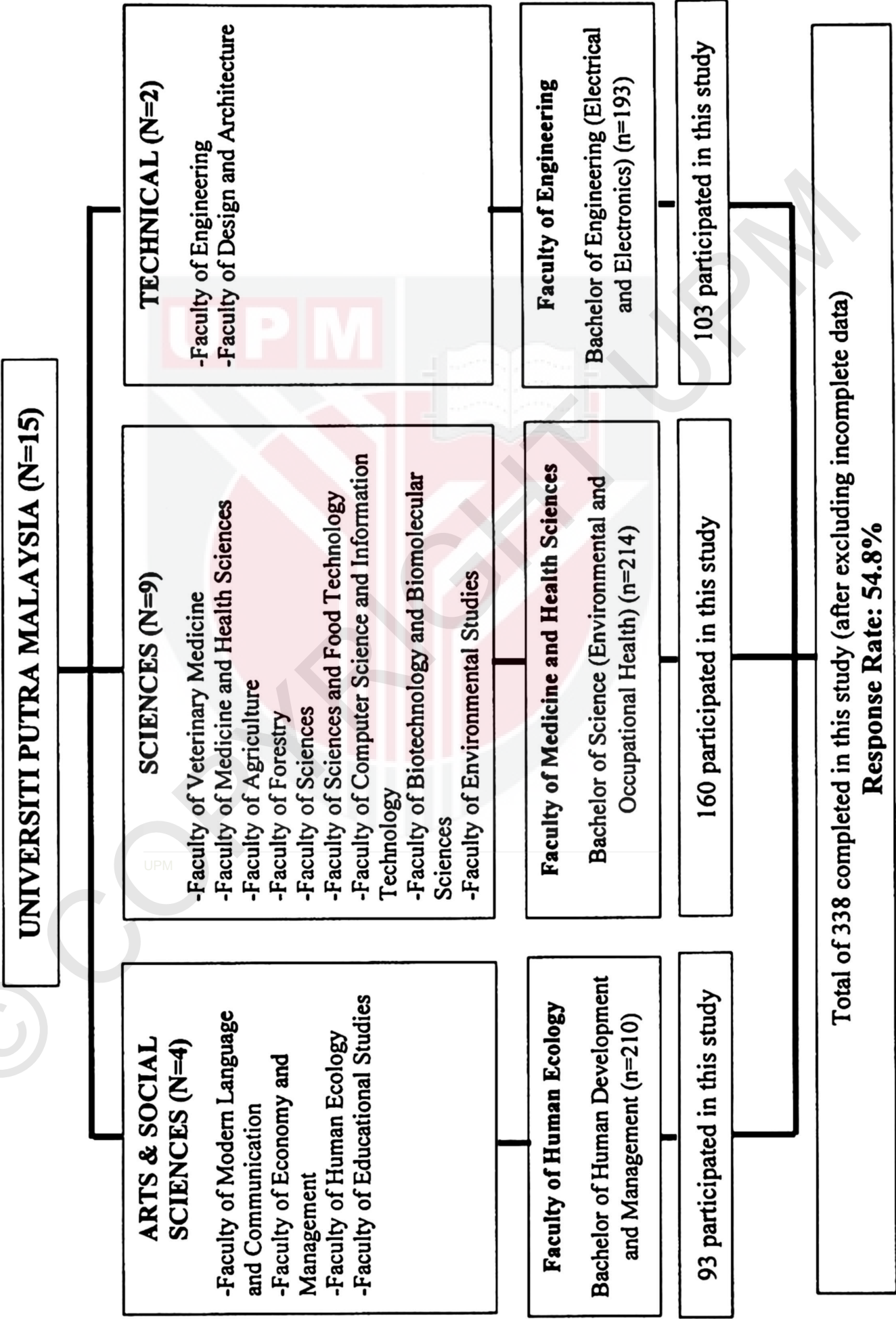


Figure 3.1: Flow chart of sampling design for selection method of respondents

3.6. STUDY INSTRUMENTS

There were two types of instrument that were used in the study. First, information regarding personal factors, psychological factors, and behavioral factors was obtained by using an English language self-administered questionnaire. Second, anthropometry measurements were measured on body weight, height, body fat percentage, and waist circumference.

3.6.1. Self-administered Questionnaire

3.6.1.1 Personal factors

Socio-demographic information consisting of age, sex, living status, faculty, programmed, year of study and monthly allowances were obtained by using a self-administered questionnaire.

3.6.1.2 Binge eating behavior

A 16-item Binge Eating Scale (Gormally et al., 1982) was used to assess the presence and severity of binge eating in this study. The response was based on 3 or 4 differently weighed statements that represents each of the items. The scores of BES ranged from 0 to 46 and were classified into three categories. Respondents with a score ≤ 17 were considered as non-binge eaters, 18-26 were classified as moderate binge eaters and those scored ≥ 27 were classified as severe binge eaters. Respondents were considered to have binge eating behaviors when they were classified into moderate and severe binge eater categories. This BES showed good convergent validity with 81.8% of sensitivity and 97.8% of specificity and by 96.7% on discriminating cases of binge eating

(Duarte, Pinto-Gouveia, Ferreira, 2015). A recent local study reported that this scale showed good internal consistency reliability with a Cronbach's alpha value of 0.73 (Gan et al., 2018). This scale also showed a good internal consistency reliability in the present study with a Cronbach's alpha value of 0.83.

3.6.1.3 Body image perception

The Contour Drawing Rating Scale (CDRS) (Thompson & Gray, 1995) was used to assess the perception of the respondents towards their own body image and their ideal body image in this study. Respondents were asked to choose the figure that reflect their current body size and the figure that they consider as an ideal body size for them. The score ranged from 1 (severely underweight) until 9 (extremely overweight). The discrepancy between ideal and current body size indicated overall body satisfaction. Positive discrepancy score indicated the desire to have a larger body size. Zero discrepancy score indicated the desired to maintain current body size. Negative discrepancy score indicated the desire to have slimmer body size. This scale showed good construct validity (Thompson & Gray, 1995) and good reliability with Cronbach's alpha value of 0.65-0.87 (Wertheim, Paxton & Tilgner, 2003). This scale also showed a good internal consistency reliability in this study with Cronbach's alpha value 0.72.

3.6.1.4 Self-esteem

A 10-item Rosenberg Self-Esteem Scale (Rosenberg et al., 1965) was used to evaluate the self-esteem level among the respondents by measuring the positive or negative feeling about self. Respondents responded to the items 1, 3, 4, 7 and 10 based on

4-point Likert scale (0=strongly disagree; 1=disagree; 2=agree; 3=strongly agree). Items 2, 5, 6, 8 and 9 were reversed score. The total score of this scale ranged between 0 and 30. A higher score indicated high self-esteem level. The scale showed strong convergent validity for students and community (Robin, Hendin & Trzesniewski, 2001). The scale also showed good internal consistency reliability with a Cronbach's alpha coefficient of 0.73 among Malaysians (Gan et al., 2018). In the current study, this scale showed good internal consistency reliability with a Cronbach's alpha value of 0.78.

3.6.1.5 Social physique anxiety

A 12-item Social Physique Anxiety Scale (Hart, Leary, & Rejeski, 1989) was used to measure social anxiety that related to physique that referred to body fat, muscular tone and general body proportions. The items were answered based on 5 scales which were 1=not at all characteristic of me, 2=slightly characteristic of me, 3=moderately characteristics of me, 4=very characteristic of me and 5=extremely characteristic of me for items 3, 4, 6, 7, 9, 10 and 12. Items 1, 2, 5, 8 and 11 were reversed score. The scale was scored by summing up the responses. The scale score ranged within 12-60. The higher score indicated greater anxiety towards physique. This 12-item scale showed adequate construct validity (Hart, et al., 1989) and excellent internal consistency reliability with a Cronbach's alpha value of 0.92 (Fritzsimmmons, 2012). In the current study, this scale showed a good internal consistency with a Cronbach's alpha value of 0.71.

3.6.1.6 Depression

A 10-item Center for Epidemiologic Studies Depression Scale Revised (Radloff, 1977) was used in this study to assess the presence of depressive symptoms. Respondents responded to the items based on the frequency which were 0 (less than 1 day), 1 (1-2 days), 2 (3-4 days) and 3 (5-7 days). The score was reversed for items 5 and 8. The total score was calculated by summing up the 10 items. Depression was classified into two categories: no depressive symptoms (<10) and has depressive symptoms (≥ 10). The scale showed good internal consistency with a Cronbach's alpha value of 0.86 and also good convergent and divergent validity (Miller et al., 2008). In the present study, this scale showed a good internal consistency reliability with a Cronbach's alpha value of 0.75.

3.6.1.7 Physical activity

A 16-item Global Physical Activity Questionnaire (World Health Organization, 2002) was used in this study to evaluate physical activity level among respondents based on three domains, which were work, transport and leisure time as well as sedentary behavior. All the questions must be answered by the respondents. However, the questions that can be skipped were the questions that are corresponding to the number of days and times if the questions are answered negatively. Metabolic Equivalents (METs) is used to analyze the response. Table 3.4 below shows the METs value classification:

Table 3.4: METs value classification

Domain	MET value
Work	Moderate MET value = 4.0 Vigorous MET value = 8.0
Transport	Cycling and walking MET value = 4.0
Recreation	Moderate MET value = 4.0 Vigorous MET value = 8.0

The MET-min per week was calculated based on the formula shown below:

$$\text{MET-min per week} = \text{MET level} \times \text{minutes of activity/day} \times \text{days per week}$$

The response was categorized into inactive low (<600 MET-min), active (600-3000 MET-min) and highly active (>3000 MET-min). A validity study of GPAQ on nine countries showed that this questionnaire has an acceptable concurrent validity and also reported moderate to substantial strength of reliability (Kappa 0.67 to 0.73) (Bull, Maslin & Armstrong, 2009).

3.6.1.8 Food preoccupation

A 26- item Food Preoccupation Questionnaire (Tapper & Pothos, 2010) was used in this study in order to examine the frequency and emotionality of food-related thoughts in which positive, negative as well as neutral thought about food is taking into account. The items were answered based on 5-Likert scale which were 1 (completely disagree); 2 (Disagree a bit); 3 (Neither agree nor disagree); 4 (Agree a bit) and 5 (Completely Agree). The scoring was done by computing the mean score of the items according to subscales; frequency of thoughts about food (items 1, 3, and 17), extent to which thoughts have a positive emotional valence (items 5, 8, 10, 14, 16, 19, 21, 24 and 26) extent to which thoughts have a negative valence (items 2, 6, 7, 11, 13, 15, 18, 22 and 25) and extent to

which thoughts have a neutral valence (4, 9, 12, 20 and 23). The higher the mean score indicated high food preoccupation. The scale showed good construct validity and high internal consistency for thought frequency, positive statement, negative statement and neutral statement were 0.87, 0.81, 0.80 and 0.73, respectively (Tapper & Pothos, 2010). In this study, the scale showed good internal consistency reliability for thought frequency, positive statement, negative statement and neutral statement with Cronbach's alpha values of 0.52, 0.83, 0.83 and 0.65, respectively.

3.6.1.9 Dietary Restraint

A 10-item Revised Restrained Scale (Herman & Polivy, 1980) was used in the study for measuring the extent of dieting and concern about weight gain. The response for items 1 was based on 5-point Likert scale (0=never, 1=rarely, 2=sometimes, 3=usually, 4=always). However, the other responses were based on 4-Likert scale (0=not at all, 1=slightly, 2=moderately, 3=extremely) for items 5 and 9 while another 4-Likert scale (0=never, 1=rarely, 2=often, 3=always) for items 6, 7 and 8. The rest of the items were based on range scale (0=0-2.5 kg, 1=2.5-5.0 kg, 2=5.0-7.5 kg, 3=7.5-10.0 kg, 4=>10 kg) for item 2, (0=0-0.5 kg, 1=0.5-1.0 kg, 2=1.0-1.5 kg, 3=1.5-2.5 kg, 4=>2.5 kg) for item 3 and 4 and the other range scale (0=0-0.5 kg, 1=0.5-3 kg, 2=3-5 kg, 3=5-10 kg, 4=>10 kg) for item 10. The final score was calculated by adding up all the responses for each of the questions. The total score higher than 15 indicated a high degree of dietary restraint. The scale showed good internal consistency with a Cronbach's alpha value 0.71 and also showed good convergent and divergent validity (Makk & Lai, 2012). In the

present study, this scale showed a good internal consistency reliability with Cronbach's alpha value of 0.71.

3.6.2 Anthropometry Measurements

Body weight was measured by using TANITA Digital Weight Scale HD-319 (TANITA Corporation, Arlington Heights, IL, USA) to the nearest 0.1 kg. Besides, SECA Body Tape Measure SE206 (SECA, Hamburg, Germany) to the nearest 0.1 cm was used to measure height. Body weight and height measurements were used to calculate the Body Mass Index (BMI) as follow:

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

BMI was used to categorize respondents' degree of obesity according to World Health Organization (2000) classification as shown in Table 3.5.

Table 3.5: Cut off value for Body Mass Index (BMI)

BMI CATEGORY	CUT OFF VALUE (kgm^{-2})
Underweight	<18.5
Normal	18.5-24.9
Overweight / Pre-obese	25.0-29.9
Obese I	30.0-34.9
Obese II	35.0-39.9
Obese III	≥ 40.0

Body fat percentage was measured by using OMRON body fat monitor HBF-302 (Omron Matsusaka Co. Ltd, Matsusaka, Japan). The body fat percentage was categorized into four groups according to Lee and Nieman (2003) as shown in Table 3.6.

Table 3.6: Body fat categories according to Lee and Nieman (2003)

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%

Abdominal obesity was identified by measuring waist circumference by using Lufkin Executive Diameter steel tape W606PM (Cooper Hand Tools, Raleigh, North Carolina, USA). Waist circumference was divided into two categories as shown in Table 3.7 (WHO/IASO/IOTF, 2000).

Table 3.7: Waist circumference category by sex

Gender	Waist circumference (cm)	
	Normal	Abdominal Obesity
Male	<90	≥90
Female	<80	≥80

3.7. STUDY APPROVAL

Ethical approval was sought from Ethics Committee for Research Involving Human Subjects of Universiti Putra Malaysia (Reference Number: JKEUPM-2018-336; see Appendix A) prior to data collection. Then, permission was obtained from the Dean of Faculty of Medicine and Health Sciences, Faculty of Human Ecology, and Faculty of Engineering (see Appendix B) to conduct the study.

3.8. PRE-TESTING

Pre-testing was conducted among 10 students prior actual data collection by using the same self-administered questionnaire. Pre-testing was conducted in order to check the suitability of the questionnaire and the ability of participants to answer the questionnaire.

Besides, it was also to ensure that the instructions and questions are understandable, clear and without ambiguity. It also to determine the inappropriateness of the questionnaire due to the sensitive questions. The students spent about 30 minutes to complete the questionnaire.

3.9. PROCEDURES

Data collection was conducted from February to March 2019. The class representative from each year of the programmes was contacted to arrange the time and place to complete the questionnaires as well as taking anthropometric measurements. The data collection was conducted in the evening when most of the students finished their class. Data collection was conducted in either lecture hall, tutorial room or any available room. On the day of data collection, respondents were given the information sheet and consent form (see Appendix C) by the researcher. Written informed consent was obtained from the respondents prior to the data collection. Respondents answered a self-administered questionnaire (see Appendix D) followed by anthropometry measurements (body weight, height, waist circumference, and body fat) measured by the researcher. Participants who had completed the questionnaires and anthropometry measurements were given stationaries as a token of appreciation.

3.10. STATISTICAL ANALYSES

All the statistical analyses were performed by using IBM SPSS Statistics 23 (IBM Corp., Armonk, New York, USA). Univariate analysis was used to analyze descriptive data and the results were presented as frequencies and percentages for categorical

variables and as means and standard deviations for continuous variables. Pearson's product moment correlation and Chi-square tests were used to determine the associations between personal factors, psychological factors and behavioral factors with binge eating behavior. Besides, non-parametric test, Spearman's Rank Order was used for not normally distributed data. 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 factors

The total eligible respondents in this study were 617 students, however, only 356 students answered and returned the questionnaires. This gave a response rate of 54.8%. After excluding incomplete questionnaire, a total of 338 respondents included in the final analysis. The distribution of respondents by socio-demographic background is described in Table 4.1. The respondents were 31.4% males and 68.6% females and their average age was 20.98 years ($SD=1.40$ years), ranging from 18 to 25 years old. Majority of the respondents were Malay (88.5%), second year students (29.9%), and stayed in college dormitory (89.9%). The mean monthly allowance received by the respondents was RM492.15 ($SD=RM7.56$), in which more than half of the respondents (56.2%) reported to have a monthly allowance of $\leq$ RM300.

Table 4.1: Socio-demographic backgrounds of the respondents (n=338)

Characteristics	Mean $\pm$ SD	n (%)
Age	20.98 $\pm$ 1.40	
18-19		60 (17.8)
20-22		238 (70.4)
23-25		40 (11.8)
Sex		
Male		106 (31.4)

Table 4.1: Socio-demographic backgrounds of the respondents (n=338) (cont.)

Characteristics	Mean ± SD	n (%)
Female		232 (68.6)
Ethnicity		
Malay		299 (88.5)
Indian		15 (4.4)
Chinese		13 (3.8)
Others		11 (3.3)
Religion		
Islam		308 (91.1)
Buddha		12 (3.6)
Hindu		11 (3.3)
Christian		7 (2.1)
Programme		
OSH		153 (45.3)
EEE		98 (29.0)
HDM		87 (25.7)
Year of Study		
First year		81 (24.0)
Second year		101 (29.9)
Third year		76 (22.5)
Fourth year		80 (23.7)
Accommodation		
College		304 (89.9)
Outside campus		17 (5.0)
Home		17 (5.0)
Allowance	492.15 ± 7.56	
≤300		190 (56.2)
301-600		111 (32.8)
601-900		16 (4.7)
901-1200		15 (4.4)
≥1201		6 (1.8)

SD = standard deviation; OSH = Occupational and Environmental Health; EEE = Electrical and Electronic Engineering; HDM = Human Development and Management

4.1.2 Body composition

Table 4.2 shows the distribution of body composition of the respondents by sex. The average height of the respondents was 1.61 m (*SD*=0.09 m) with male respondents (1.70 ± 0.07 m) were taller compared to female respondents (1.57 ± 0.06 m). A study done by McLester et al. (2018) among 212 college students from a public university in the

southeast region of the United States also showed that males (178.0 ± 7.1 cm) were taller than females (164.6 ± 6.4 cm). Similarly, a local study conducted by Hazizi et al. (2012) among 174 university students also showed that males (170.5 ± 7.4 m) were taller than females (158.9 ± 5.9 m).

Besides, the average weight of the respondents was 60.63 kg ($SD=16.24$ kg) with male respondents (70.68 ± 16.82 kg) tend to have high body weight compared to female respondents (56.03 ± 13.73 kg). Similarly, a study conducted by Davar (2015) among 283 university students in Kurukshetra University in India showed that males (57.6 ± 5.4 kg) had slightly higher body weight compared to females (52.0 ± 3.8 kg). Another study done by Tahereh, Hazizi and Rosita (2015) among 311 students in UPM also showed that males reported to have higher body weight (76.16 ± 10.67 kg) compared to females (58.83 ± 8.94 kg).

Table 4.2: Body weight composition distribution of the respondents by sex

Variables	Mean $\pm$ SD / n (%)		
	Male (n=106)	Female (n=232)	Total (n=338)
Height (m)	1.70 $\pm$ 0.07	1.57 $\pm$ 0.06	1.61 $\pm$ 0.09
Weight (kg)	70.68 $\pm$ 16.82	56.03 $\pm$ 13.73	60.63 $\pm$ 16.24
Body mass index (kg/m ²)	24.34 $\pm$ 5.36	22.77 $\pm$ 5.29	23.26 $\pm$ 5.36
Underweight	8 (7.6)	33 (14.2)	41 (12.1)
Normal	61 (57.5)	149 (64.2)	210 (62.1)
Overweight	17 (16.0)	30 (12.9)	47 (13.9)
Obese I	15 (14.2)	16 (7.0)	31 (9.2)
Obese II	4 (3.8)	1 (0.4)	5 (1.5)
Obese III	1 (0.9)	3 (1.3)	4 (1.2)
Waist circumference (cm)	79.51 $\pm$ 12.12	71.16 $\pm$ 9.74	73.78 $\pm$ 11.22
Normal	87 (82.1)	199 (85.8)	286 (84.6)
Abdominal obesity	19 (17.9)	33 (14.2)	52 (15.4)
Body fat percentage (%)	24.50 $\pm$ 16.62	30.21 $\pm$ 6.13	28.42 $\pm$ 10.90
Acceptable (lower)	16 (15.1)	33 (14.2)	49 (14.5)
Acceptable (upper)	56 (52.8)	118 (50.9)	174 (51.5)
Unhealthy (too high)	34 (32.1)	81 (34.9)	115 (34.0)

Furthermore, this study reported that the mean BMI for all respondents was $23.26 \pm 5.36 \text{ kg/m}^2$ with male having a mean BMI of $24.34 \pm 5.36 \text{ kg/m}^2$ while female having a mean BMI of $22.77 \pm 5.29 \text{ kg/m}^2$. The results showed that 12.1% of the respondents were underweight, 13.9% were overweight, and 11.9% were obese. More females were underweight while more males were overweight and obese. This result was supported by a recent local study done by Gan, Chin and Law (2019) among 270 Malaysian university students reported that the mean BMI of the students was $23.06 \pm 5.09 \text{ kg/m}^2$ in which 14.5% of them were underweight, 13.8% were overweight and 11.2% were obese. Similarly, Balaraman et al. (2017) reported that 14.6% of the students in Negeri Sembilan were underweight, 23.3% were pre-obese and 8.7% were obese I and obese II, in which more females (17.1%) were underweight compared males (9.1%), while more males (45.5%) were classified as overweight and obese than females (25.7%). In contrast, a study conducted by Davar (2015) among 283 university students in Kurukshetra University in India showed that 12.14% of the students were underweight, 28.42% were overweight and 26.57% were obese, in which more females were reported to be both underweight (10.1%) and overweight and obese (47.8%) compared to males (2.1% underweight and 7.2% overweight and obese).

The mean waist circumference for all respondents in this study was $73.78 \pm 11.22 \text{ cm}$. The results showed that 15.4% of the respondents were having abdominal obesity, with 17.9% of the male respondents and 14.2% of the female respondents reported to have abdominal obesity. A study conducted by Hazizi et al. (2012) among undergraduate students in a local university showed that the mean waist circumference was $76.7 \pm 10.1 \text{ cm}$, with 6.3% of males and 10.9% of females reported to have abdominal obesity.

Another study conducted by Khwanchuea, Thanapop, Samuhasaneeto, Chartwaingam and Mukem (2013) among 217 university students in Thailand reported the average waist circumference of the students was 74.9 cm ($SD=9.6$ cm) with 21.8% of the male students and 18.5% of the female students were having abdominal obesity. A recent local study conducted by Gan et al. (2019) reported that the mean waist circumference of the students was 75.2 ± 11.0 cm, in which 20.1% were having abdominal obesity.

The mean of body fat percentage for all respondents was $28.42 \pm 10.90\%$ with female respondents ($30.21 \pm 6.13\%$) having higher mean body fat percentage compared to male respondents ($24.50 \pm 16.62\%$). One third of the respondents (34.0%) were found to have high body fat percentage, in which 32.1% of the male respondents and 34.9% of the female respondents were having too high level of body fat percentage. A study conducted by Gomez-Londono and Gonzalez-Correa (2018) among 420 university students in Colombia reported that the mean of body fat percentage of the students was $25.0 \pm 8.2\%$ with females ($32.0 \pm 4.4\%$) having higher mean body fat percentage compared to males ($18.4 \pm 4.6\%$). The study also showed that 46.4% of the students had high level body fat percentage, in which 45.8% of females and 47.0% of males were having too high body fat percentage. Another study conducted by Hung et al. (2015) among 894 young adults showed that females were having higher mean body fat percentage ($28.4 \pm 5.3\%$) compared to males ($18.5 \pm 6.2\%$).

4.2 BINGE EATING BEHAVIOR

Table 4.3 shows the distribution of respondents by items in the Binge Eating Scale (BES). The mean score of the BES was 12.83 ($SD=7.19$), ranging from 0 to 37. The results

showed that 65.4% of the respondents were capable to control their eating urges whenever they want to. Besides, most of the respondents showed that they don't have problem to stop eating once they full (61.8%) and they also seem comfortable to eat as much as they want while eating with others (69.2%).

Table 4.3: Distribution of respondents according to response to each item related to binge eating behavior (n=338)

	Items	n (%)
Q1	Self-consciousness about appearance/weight	
	I don't feel self-conscious about my weight or body size when I'm with others.	70 (20.7)
	I feel concerned about how I look to others, but it normally does not make me feel disappointed with myself.	191 (56.5)
	I do get self-conscious about my appearance and weight which makes me feel disappointed in myself.	70 (20.7)
	I feel very self-conscious about my weight and frequently, I feel intense shame and disgust for myself. I try to avoid social contacts because of my self-consciousness.	7 (2.1)
Q2	Difficulty eating slowly, rate of intake	
	I don't have any difficulty eating slowly in the proper manner.	187 (55.3)
	Although I seem to "gobble down" foods, I don't end up feeling stuffed because of eating too much food.	72 (21.3)
	At times, I tend to eat quickly and then, I feel uncomfortably full afterwards.	67 (19.8)
	I have the habit of bolting down my food, without really chewing it. When this happens I usually feel uncomfortably stuffed because I've eaten too much.	12 (3.6)
Q3	Controlling urges to eat	
	I feel capable to control my eating urges when I want to.	221 (65.4)
	I feel like I have failed to control my eating more than the average person.	66 (19.5)
	I feel utterly helpless when it comes to feeling in control of my eating urges.	33 (9.8)
	Because I feel so helpless about controlling my eating I have become very desperate about trying to get in control.	18 (5.3)

Table 4.3: Distribution of respondents according to response to each item related to binge eating behavior (n=338) (cont.)

	Items	n (%)
Q4	Eating when bored	
	I don't have the habit of eating when I'm bored.	78 (23.1)
	I sometimes eat when I'm bored, but often I'm able to "get busy" and get my mind off food.	120 (35.5)
	I have a regular habit of eating when I'm bored, but occasionally, I can use some other activity to get my mind off eating.	116 (34.3)
	I have a strong habit of eating when I'm bored. Nothing seems to help me break the habit	24 (7.1)
Q5	Hunger cues	
	I'm usually physically hungry when I eat something.	94 (27.8)
	Occasionally, I eat something on impulse even though I really am not hungry.	120 (35.5)
	I have the regular habit of eating habit of eating foods that I might not really enjoy, to satisfy a hungry feeling even though physically, I don't need the food.	81 (24)
	Even though I'm not physically hungry, I get a hungry feeling in my mouth that only seems to be satisfied when I eat a food, like a sandwich, that fills my mouth. Sometimes, when I eat the food to satisfy my mouth hunger, I then spit the food out so I won't gain weight.	43 (12.7)
Q6	Feelings of guilt/self-hate	
	I don't feel any guilt or self-hate after overeat.	186 (55.0)
	After I overeat, occasionally I feel guilt or self-hate.	132 (39.1)
	Almost all the time I experience strong guilt or self-hate after I overeat.	20 (5.9)
Q7	Loss control followed by over eating	
	I don't lose total control of my eating when dieting even after periods when I overeat.	195 (57.7)
	Sometimes when I eat a "forbidden food" on a diet, I feel like I "blew it" and eat even more.	62 (18.3)
	Frequently, I have the habit of saying to myself, "I've blown it now, why not go all the way" when I overeat on a diet. When that happens I eat even more.	56 (16.6)
	I have a regular habit of starting strict diet for myself, but I break the diets by going on an eating binge. My life seems to be either a "feast" or "famine".	25 (7.4)

Table 4.3: Distribution of respondents according to response to each item related to binge eating behavior (n=338) (cont.)

	Items	n (%)
Q8	Quantity of food, feeling “stuffed” after eating	
	I rarely eat so much food that I feel uncomfortably stuffed afterwards.	131 (38.8)
	Usually about once a month, I eat such a quantity of food, I end up feeling very stuffed.	85 (25.1)
	I have regular periods during the month when I eat large amounts of food, either at mealtime or at snacks.	98 (29.0)
	I eat so much food that I regularly feel quite uncomfortable after eating and sometimes a bit nauseous.	24 (7.1)
Q9	Patterns of restricting/overeating	
	My level of calorie intake does not go up very high or go down very low on a regular basis.	160 (47.3)
	Sometimes after I overeat, I will try to reduce my caloric intake to almost nothing to compensate for the excess calories I’ve eaten.	109 (32.3)
	I have a regular habit of overeating during the night. It seems that my routine is not to be hungry in the morning but I overeat in the evening.	54 (16.0)
	In my adult years, I have had week-long periods where I practically starve myself. This follows periods when I overeat. It seems I live a life of either “feast” or “famine”.	15 (4.4)
Q10	Hunger cues/urges to eat	
	I usually am able to stop eating when I want to. I know when “enough is enough”.	191 (56.5)
	Every so often, I experience a compulsion to eat which I can’t seem to control.	80 (23.7)
	Frequently, I experience strong urges to eat which I seem unable to control, but at other times I can control my eating urges.	63 (18.6)
	I feel incapable of controlling urges to eat. I have a fear of not being able to stop eating voluntarily.	4 (1.2)
Q11	Stopping eating when satiated	
	I don’t have any problem stopping eating when I feel full.	209 (61.8)
	I usually can stop eating when I feel full but occasionally overeat leaving me feeling uncomfortably stuffed.	101 (29.9)
	I have a problem stopping eating once I start and usually I feel uncomfortably stuffed after I eat a meal.	23 (6.8)
	Because I have a problem not being able to stop eating when I want, I sometimes have to induce vomiting to relieve my stuffed feeling.	5 (1.5)

Table 4.3: Distribution of respondents according to response to each item related to binge eating behavior (n=338) (cont.)

	Items	n (%)
Q12	Eating habits in public/private	
	I seem to eat just as much when I'm with others (family, social gatherings) as when I'm by myself.	234 (69.2)
	Sometimes, when I'm with other persons, I don't eat as much as I want to eat because I'm self-conscious about my eating.	55 (16.3)
	Frequently, I eat only a small amount of food when others are present, because I'm very embarrassed about my eating.	37 (10.9)
	I feel so ashamed about overeating that I pick times to overeat when I know no one will see me. I feel like a "closet eater".	12 (3.6)
Q13	Regularity of eating habits	
	I eat three meals a day with only an occasional between meal snacks.	142 (42.0)
	I eat 3 meals a day, but I also normally snack between meals.	109 (32.2)
	When I am snacking heavily, I get in the habit of skipping regular meals.	51 (15.1)
	There are regular periods when I seem to be continually eating, with no planned meals.	36 (10.7)
Q14	Thoughts about urges to eat	
	I don't think much about trying to control unwanted eating urges.	157 (46.4)
	At least some of the time, I feel my thoughts are pre-occupied with trying to control my eating urges.	99 (29.3)
	I feel that frequently I spend much time thinking about how much I ate or about trying not to eat anymore.	62 (18.3)
	It seems to me that most of my waking hours are pre-occupied by thoughts about eating or not eating. I feel like I'm constantly struggling not to eat.	20 (5.9)
Q15	Food craving/food preoccupation	
	I don't think about food a great deal.	80 (23.7)
	I have strong cravings for food but they last only for brief periods of time.	194 (57.4)
	I have days when I can't seem to think about anything else but food.	44 (13.0)
	Most of my days seem to be pre-occupied with thoughts about food. I feel like I live to eat.	20 (5.9)
Q16	Knowledge about nature of own physical hunger	
	I usually know whether or not I'm physically hungry. I take the right portion of food to satisfy me.	185 (54.7)
	Occasionally, I feel uncertain about knowing whether or not I'm physically hungry. At these times it's hard to know how much food I should take to satisfy me.	109 (32.2)
	Even though I might know how many calories I should eat, I don't have any idea what is a "normal" amount of food for me.	44 (13.0)
	Binge eating total score	12.83 ± 7.19
	Min – Max	0 – 37

As shown in Table 4.4, the prevalence of binge eating behavior in this study was 27.2%, in which 23.4% of the respondents were moderately binge eating and 3.8% were severely binge eating. This prevalence was higher as compared to other previous studies. A recent study done by Thu et al. (2019) among Malaysian university students showed that only 10% of the students engaged with BEB. Another studies conducted by Shin and Yi (2014) and Ribeiro, Conceicao and Machado (2014) showed that only 8% and 9.6% of the students engaged with BEB, respectively.

More male students engaged in BEB (33.9%) compared to female students (24.1%) in this study. A previous study conducted by Eneva et al. (2017) among 1022 undergraduate students at Northeast mid-Atlantic university reported that prevalence of BEB was slightly higher among men (26.1%) compared to women (23.9%). This is because men were highly associated with reward sensitivity in order to seek the feelings of pleasure via food in which can promote BEB (Eneva et al., 2017). The elevation of reward sensitivity among binge eaters was due to medial orbitofrontal cortex (OFC) activation that influenced by the presence of food, thus translate the reward drive into compulsive overeating in BEB (Schienle et al., 2009). However, this result was contradicted with a study conducted by Memon et al. (2012) among medical students in Karachi, which reported that females had higher prevalence of BEB (87.9%) as compared to males (12.1%). Similarly, a study conducted by Thu et al. (2019) also showed that more females (11.9%) were classified with BEB compared to males (5.7%).

Table 4.4: Mean and binge eating behavior distribution of respondents by sex

Variables	Mean $\pm$ SD / n (%)		
	Male (n=106)	Female (n=232)	Total (n=338)
Binge eating behavior	13.41 $\pm$ 7.50	12.56 $\pm$ 7.05	12.83 $\pm$ 7.19
No	70 (66.1)	176 (75.9)	246 (72.8)
Moderate	33 (31.1)	46 (19.8)	79 (23.4)
Severe	3 (2.8)	10 (4.3)	13 (3.8)

4.3 PSYCHOLOGICAL FACTORS

4.3.1 Body Image Perception

Table 4.5 shows the distribution of the respondents by female current body size figures. The results showed that most of the respondents chose Figures 3 (23.1%) and 4 (22.5%) as current body size for female. Similarly, among the female respondents, most of them chose Figures 3 (25.0%) and 4 (22.9%) as their current body size. In contrast, among male respondents, most of them (23.6%) chose Figure 6 as current body size for females. This indicated that male respondents tend to choose bigger body size as female current body size compared to female respondents.

Table 4.5 Distribution of the respondents by female current body size figures (n=338)

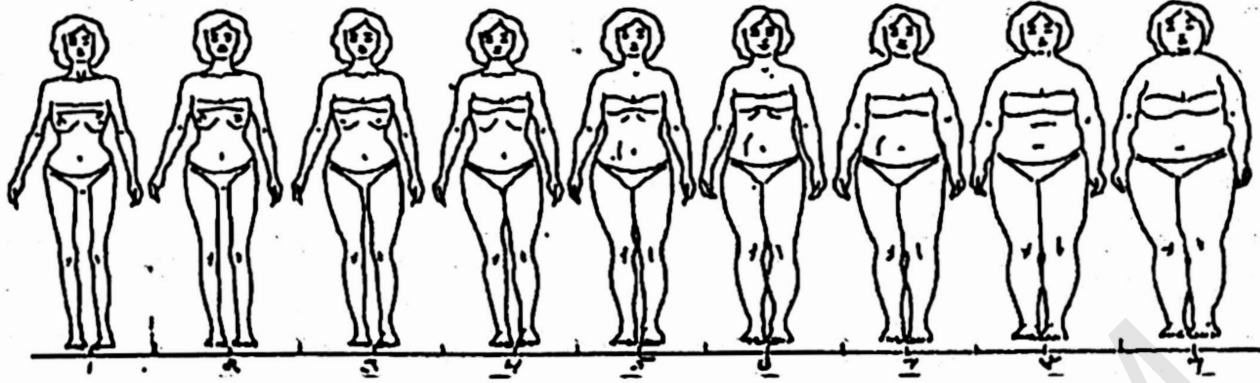
								
Sex	n (%)							
	1	2	3	4	5	6	7	8
Male	3 (2.8)	5 (4.7)	20 (18.9)	23 (21.7)	20 (18.9)	25 (23.6)	6 (5.7)	3 (2.8)
Female	10 (4.3)	34 (14.7)	58 (25.0)	53 (22.9)	39 (16.8)	23 (9.9)	7 (3.0)	6 (2.6)
Total	13 (3.8)	39 (11.5)	78 (23.1)	76 (22.5)	59 (17.5)	48 (14.2)	13 (3.8)	9 (2.7)

Table 4.6 shows the distribution of the respondents by male current body size figures. Majority of the respondents chose Figure 5 as current body size (29.0%) for male. Most of the female respondents chose Figure 5 as male current body size (33.2%), while most of the male respondents chose Figure 6 as male current body size (21.7%). This portrayed that male respondents have high tendency to choose bigger body size as current body size for themselves as compared to female respondents.

Table 4.6 Distribution of the respondents by male current body size figures (n=338)

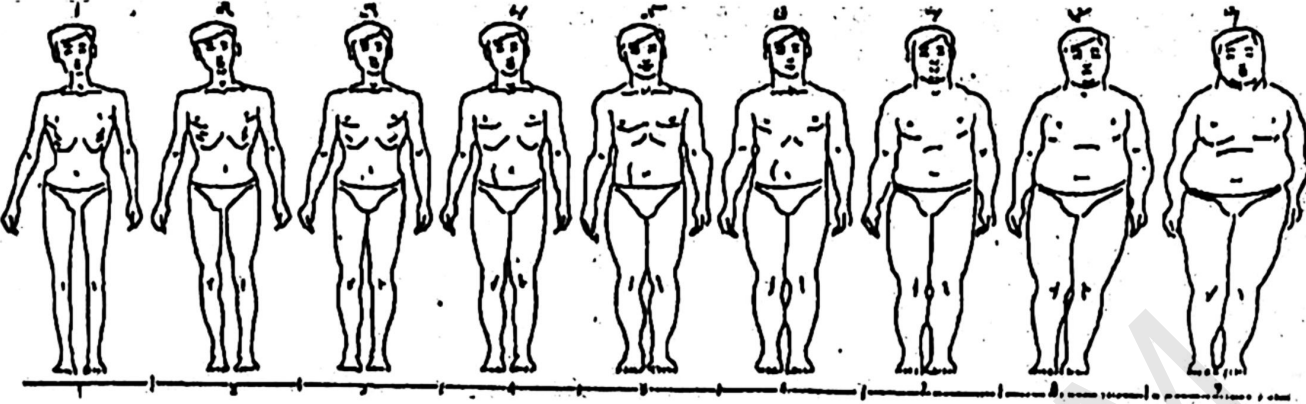
								
Sex	n (%)							
	1	2	3	4	5	6	7	8
Male	2 (1.9)	5 (4.7)	16 (15.1)	21 (19.8)	21 (19.8)	23 (21.7)	11 (10.4)	5 (4.7)
Female	2 (0.9)	11 (4.7)	38 (16.4)	60 (25.9)	77 (33.2)	37 (15.9)	3 (1.3)	3 (1.3)
Total	4 (1.2)	16 (4.7)	54 (16.0)	81 (24.0)	98 (29.0)	60 (17.8)	14 (4.1)	8 (2.4)

Table 4.7 shows the distribution of the respondents by female ideal body size figures. One third of the respondents chose Figure 4 (34.0%) as ideal body size for females. Among female respondents, most of them chose Figure 3 (36.2%) and 4 (36.2%) as their ideal body size. In contrast, most of the male respondents chose Figure 5 (43.4%) as female ideal body size. This showed that male respondents tend to choose moderate body size as ideal body size for female.

Table 4.7 Distribution of the respondents by female ideal body size figures (n=338)

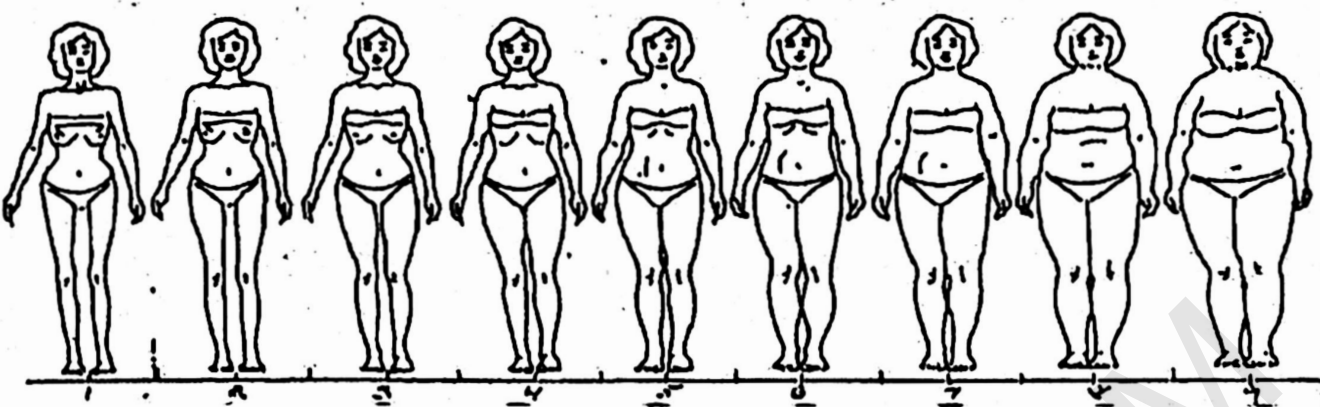
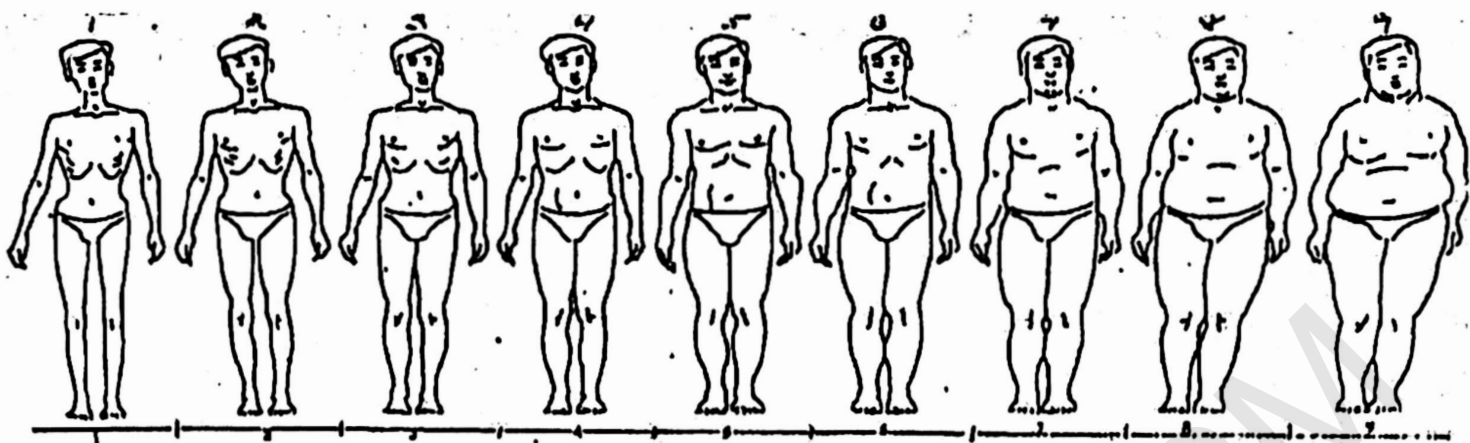
								
Sex	n (%)							
	1	2	3	4	5	6	7	8
Male	-	3 (2.8)	14 (13.2)	31 (29.2)	46 (43.4)	8 (7.5)	2 (1.9)	1 (0.9)
Female	3 (1.3)	23 (9.9)	84 (36.2)	84 (36.2)	32 (13.8)	6 (2.6)	-	-
Total	3 (0.9)	26 (7.7)	98 (29.0)	115 (34.0)	78 (23.1)	14 (4.1)	2 (0.6)	1 (0.3)

Table 4.8 shows the distribution the respondents by male ideal body size figures. The results showed that more than half of the respondents chose Figure 5 (54.4%) as ideal body size for males. Similarly, there were also high prevalence of both males (63.2%) and females (50.4%) who chose Figure 5 as male ideal body size. This indicated that majority of the respondents including both male and female respondents tend to choose moderate body size as male ideal body size.

Table 4.8 Distribution of the respondents by male ideal body size figures (n=338)



Sex	n (%)							
	2	3	4	5	6	7	8	9
Male	-	3 (2.8)	13 (12.3)	67 (63.2)	19 (17.9)	2 (1.9)	1 (0.9)	1 (0.9)
Female	6 (2.6)	24 (10.3)	69 (29.7)	117 (50.4)	16 (6.9)	-	-	-
Total	6 (1.8)	27 (8.0)	82 (24.3)	184 (54.4)	35 (10.4)	2 (0.6)	1 (0.3)	1 (0.3)

Table 4.9 shows the distribution of body image perception of the respondents by sex. The results showed that majority of the respondents were dissatisfied with their body size (77.2%), in which 43.5% of the respondents desired to have a smaller body size and another 33.7% desired to have a bigger body size. Male respondents desired to have a bigger body size (43.4%) while female respondents desired to have a smaller body size (47.0%). These results were similar with a study conducted by Ansan et al. (2010) among university students in England and Denmark, which showed that more males perceived themselves too thin which drive them to have a bigger body size, while females had high tendency to perceive themselves too fat which triggered them to have smaller body size.

Similarly, a study conducted by Ferrari, Petroski and Silva (2013) among 236 university students in Florianopolis, southern Brazil also showed that males were more likely to have bigger body size due to dissatisfaction with slimness while females were more likely to have smaller body size due to dissatisfaction with excessive weight. The desire to look attractive based on physical appearance in which attractiveness usually defined as being thin for females or being muscular for males (Brennan, Lalonde & Bain, 2010).

Table 4.9: Distribution of body image perception of the respondents by sex

Variables	n (%)		
	Male (n=106)	Female (n=232)	Total (n=338)
Body image perception			
Dissatisfaction, desired to have a smaller size	38 (35.8)	109 (47.0)	147 (43.5)
Satisfaction	22 (20.8)	55 (23.7)	77 (22.8)
Dissatisfaction, desired to have a bigger size	46 (43.4)	68 (29.3)	114 (33.7)

As shown in Table 4.10, 60.7% of the male respondents with normal weight underestimated their body size and perceived themselves to be thin, while 16.4% of them overestimated their body size by perceiving themselves to be fat. Besides, overweight male respondents underestimated their body size by perceiving themselves to be thin (5.9%) and normal (23.5%).

For female respondents, 9.1% and 6.1% of the underweight females overestimated themselves to be normal and fat, respectively. Besides, almost half (42.3%) of the normal weight females overestimated themselves to be fat while another 25.5% underestimated themselves to be thin. The results also showed that one third of the obese III females (33.3%) underestimated their body size to be normal.

Table 4.10: Comparison between perception of current weight status and actual weight status by sex

Actual weight status	Perception of body size					
	Males (n=106)			Females (n=232)		
	Thin n (%)	Normal n (%)	Fat n (%)	Thin n (%)	Normal n (%)	Fat n (%)
Underweight	8 (100.0) ^a	–	–	28 (84.8) ^a	3 (9.1) ^c	2 (6.1) ^c
Normal	37 (60.7) ^b	14 (23.0) ^a	10 (16.4) ^c	38 (25.5) ^b	48 (32.2) ^a	63 (42.3) ^c
Overweight	1 (5.9) ^b	4 (23.5) ^b	12 (70.6) ^a	1 (3.3) ^b	2 (6.7) ^b	27 (90.0) ^a
Obese I	–	3 (20.0) ^b	12 (80.0) ^a	1 (6.3) ^b	1 (6.3) ^b	14 (87.5) ^a
Obese II	–	1 (25.0) ^b	3 (75.0) ^a	–	–	1 (100.0) ^a
Obese III	–	–	1 (100.0) ^a	–	1 (33.3) ^b	2 (66.7) ^a
Total	46 (43.4)	22 (20.8)	38 (35.8)	68 (29.3)	55 (23.7)	109 (47.0)

^aCorrect estimator, ^bUnder estimator, ^cOver estimator

4.3.2 Self-esteem

As shown in Table 4.11, 61.3% of the respondents agreed that they were capable to do things that also done by others. Most of the respondents (44.4%) disagreed that they did not have much to be proud of. One third of the respondents (37.3%) strongly agreed that they take positive attitude towards themselves, while 22.2% of them strongly disagreed that they were a failure.

The mean total score for self-esteem in this study was 17.85 ± 4.71 , with a minimum score of 1 and a maximum score of 30. Similarly, a study conducted by Rosli et al. (2011) among undergraduate students showed that the mean total score for self-esteem was 17.44 ± 3.44 , with a minimum score of 0 and a maximum score of 30. Likewise, the mean total score for self-esteem among UiTM undergraduate students was found to be 17.30 ± 3.88 , with a minimum score of 5 and a maximum score of 29 (Ahmat, Muda & Neoh, 2017).

Table 4.11: Distribution of respondents by items in the Rosenberg Self-Esteem Scale (n=338)

RSES items	n (%)			
	Strongly agree	Agree	Disagree	Strongly disagree
1) On the whole, I am satisfied with myself.	70 (20.7)	177 (52.4)	73 (21.6)	18 (5.3)
2) At times I think I am no good at all.	23 (6.8)	116 (34.3)	127 (37.6)	72 (21.3)
3) I feel that I have a number of good qualities.	62 (18.3)	204 (60.4)	53 (15.7)	19 (5.6)
4) I am able to do things as well as most other people.	61 (18.0)	207 (61.3)	53 (15.7)	17 (5.0)
5) I feel I do not have much to be proud of.	23 (6.8)	110 (32.5)	150 (44.4)	55 (16.3)
6) I certainly feel useless at times.	28 (8.3)	118 (34.9)	120 (35.5)	72 (21.3)
7) I feel that I'm a person of worth, at least on an equal plane with others.	56 (16.6)	221 (65.4)	45 (13.3)	16 (4.7)
8) I wish I could have more respect for myself.	78 (23.1)	170 (50.3)	68 (20.1)	22 (6.5)
9) All in all, I am inclined to feel that I am a failure.	26 (7.7)	95 (28.1)	142 (41.7)	75 (22.2)
10) I take a positive attitude toward myself.	126 (37.3)	165 (48.8)	30 (8.9)	17 (5.0)
Mean ± SD	17.85 ± 4.71			
Min – Max	1 – 30			

4.3.3 Social Physique Anxiety

As shown in Table 4.12, almost half of the respondents (48.2%) moderately comfortable with the appearance of their physique or figure. Besides, 22.2% of the respondents were slightly nervous in certain social settings due to unattractive features of their physique or figure and 18.3% of the respondents felt uncomfortable knowing others evaluating their physique or figure.

Table 4.12: Distribution of respondents by items in the Social Physique Anxiety Scale (n=338)

SPAS items	n (%)				
	Not at all	Slightly	Moderately	Very	Extremely
1) I am comfortable with the appearance of my physique or figure.	16 (4.7)	34 (10.1)	163 (48.2)	99 (29.3)	26 (7.7)
2) I would never worry about wearing clothes that might make me look too thin or overweight.	37 (10.9)	66 (19.5)	120 (35.5)	79 (23.4)	36 (10.7)
3) I wish I wasn't so up-tight about my physique or figure.	26 (7.7)	55 (16.3)	160 (47.3)	68 (20.1)	29 (8.6)
4) There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively.	46 (13.6)	67 (19.8)	113 (33.4)	82 (24.3)	30 (8.9)
5) When I look in the mirror I feel good about my physique or figure.	21 (6.2)	48 (14.2)	158 (46.7)	75 (22.2)	36 (10.7)
6) Unattractive features of my physique or figure make me nervous in certain social settings.	35 (10.4)	75 (22.2)	119 (35.2)	83 (24.6)	26 (7.7)
7) In the presence of others, I feel apprehensive about my physique or figure.	25 (7.4)	64 (18.9)	161 (47.6)	68 (20.1)	20 (5.9)
8) I am comfortable with how fit my body appears to others.	23 (6.8)	61 (18.0)	132 (39.1)	95 (28.1)	27 (8.0)
9) It would make me uncomfortable to know others were evaluating my physique or figure.	23 (6.8)	52 (15.4)	104 (30.8)	97 (28.7)	62 (18.3)
10) When it comes to displaying my physique or figure to others, I am a shy person.	30 (8.9)	67 (19.8)	105 (31.1)	91 (26.9)	45 (13.3)
11) I usually feel relaxed when it's obvious that others are looking at my physique or figure.	69 (20.4)	66 (19.5)	119 (35.2)	59 (17.5)	25 (7.4)
12) When in a bathing suit, I often feel nervous about how well-proportioned my body is.	54 (16.0)	66 (19.5)	111 (32.8)	67 (19.8)	40 (11.8)
Mean ± SD	36.01 ± 6.40				
Min – Max	18 – 56				

Besides, the mean total score for the SPAS of the respondents was 36.01 ± 6.40 , with a maximum value of 56 and a minimum value of 18. A study conducted by Ugoji (2010) also showed almost similar mean score among undergraduate students in Nigeria University, which was 37.31 ± 12.17 . However, a study done by Arabaci (2008) showed that university students in Turkey had lower mean score of SPAS, which was 29.00 ± 5.04 .

4.3.4 Depression

As shown in Table 4.13, the results showed that almost half of the respondents (49.4%) felt depressed less than a day in a week. Besides, most of the respondents had trouble to keep their mind on what they were doing for 1-2 days in a week (40.8%) and felt everything they did was just an effort for 3-4 days in a week (41.4%). Only one third of the respondents (35.2%) felt happy for 5-7 days in a week. Overall, the mean total score for CESD of the respondents was 10.97 ± 5.42 , with a maximum value of 27 and a minimum value of 0.

Table 4.13: Distribution of respondents by items in the Center of Epidemiology Studies Depression (n=338)

CES-D items	n (%)			
	< 1 day	1-2 days	3-4 days	5-7 days
1) I was bothered by things that usually don't bother me.	117 (34.6)	124 (36.7)	63 (18.6)	34 (10.1)
2) I had trouble keeping my mind on what I was doing	82 (24.3)	138 (40.8)	86 (25.4)	32 (9.5)
3) I felt depressed	167 (49.4)	91 (26.9)	42 (12.4)	38 (11.2)
4) I felt that everything I did was an effort	43 (12.7)	102 (30.2)	140 (41.4)	53 (15.7)
5) I felt hopeful about the future	38 (11.2)	87 (25.7)	126 (37.3)	87 (25.7)
6) I felt fearful	121 (35.8)	132 (39.1)	61 (18.0)	24 (7.1)
7) My sleep was restless	122 (36.1)	86 (25.4)	77 (22.8)	53 (15.7)
8) I was happy	28 (8.3)	61 (18.0)	130 (38.5)	119 (35.2)
9) I felt lonely	150 (44.4)	94 (27.8)	54 (16.0)	40 (11.8)
10) I could not "get going".	136 (40.2)	113 (33.4)	59 (17.5)	30 (8.9)
Mean ± SD	10.97 ± 5.42			
Min – Max	0 – 27			

As shown in Table 4.14, more than half of the respondents in this study (55.3%) had depressive symptoms. This finding was comparable with a study conducted by Othieno et al. (2014), in which it showed high prevalence of depressive symptoms in university students (41.3%) in Kenya. However, the prevalence in this study was higher compared to another local study conducted by Shamsuddin et al. (2013) among Malaysian undergraduate students, in which it was found that 27.5% of the students had depressive symptoms. Besides, this study showed that the prevalence of depressive symptoms was slightly higher among female respondents (56.5%) compared to males (52.8%).

Table 4.14 Distribution of depression of respondents by sex

Variable	Mean $\pm$ SD/ <i>n</i> (%)		
	Male (n=106)	Female (n=232)	Total (n=338)
Depression	10.68 $\pm$ 5.53	11.10 $\pm$ 5.38	10.97 $\pm$ 5.42
No depressive symptoms	50 (47.2)	101 (43.5)	151 (44.7)
Have depressive symptoms	56 (52.8)	131 (56.5)	187(55.3)

4.4 BEHAVIORAL FACTORS

4.4.1 Physical Activity

As shown in Table 4.15, almost half of the respondents (48.5%) were doing vigorous intensity sports, fitness or recreational activities (73.6% males and 37.1% females) for at least 10 minutes and 42.3% of them spent 1-2 days in a week to do the activities. The median time spent on vigorous intensity sports, fitness or recreational activity was 60 minutes (*IQR*: 30 – 120). Besides, 49.4% of the respondents were doing moderate intensity sports, fitness or recreational activities (63.2% males and 43.1% females) for at least 10 minutes and 41.2% of them were doing the moderate activities for

1-2 days in a week. The median time spent on moderate intensity sports, fitness or recreational activity was 60 minutes (*IQR*: 30 – 90).

Table 4.15: Distribution of respondents by items in the Global Physical Activity Questionnaire (n=338)

GPAQ items	Median (IQR) / n (%)		
	Male	Female	All
Work			
Does your work involve vigorous-intensity activity for at least 10 minutes?			
Yes	48 (45.3)	44 (19.0)	92 (27.2)
No	58 (54.7)	188 (81.0)	246 (72.8)
How many days?			
<1 days	3 (6.3)	9 (20.5)	12 (13.0)
1-2 days	12 (25.0)	18 (40.9)	30 (32.6)
3-4 days	21 (19.8)	12 (27.3)	33 (35.9)
5-7 days	12 (11.3)	5 (11.4)	17 (18.5)
How much time spend on doing vigorous activities on a typical day?	60 (60 – 120)	90 (30 – 120)	85 (30 – 120)
Does your work involve moderate-intensity activity for at least 10 minutes?			
Yes	64 (60.4)	134 (57.8)	198 (58.6)
No	42 (39.6)	98 (42.2)	140 (41.4)
How many days spend on moderate-intensity activity on a typical week?			
<1 days	4 (3.8)	7 (5.3)	11 (5.6)
1-2 days	34 (52.3)	45 (33.8)	79 (39.9)
3-4 days	20 (30.8)	53 (22.8)	73 (36.9)
5-7 days	7 (10.8)	28 (21.1)	35 (17.7)
How much time do you spend doing moderate-intensity activity on a typical day?	60 (30 – 120)	60 (30 – 120)	60 (30 – 120)
Travel to and from places			
Do you walk or use bicycle for at least 10 minutes to get to and from places?			
Yes	58 (54.7)	123 (53.0)	181 (53.6)
No	48 (45.3)	109 (47.0)	157 (46.4)
How many days do you walk or bicycle for at least 10 minutes continuously to get to and from places/			
<1 days	4 (6.9)	3 (1.3)	7 (3.9)

Table 4.15: Distribution of respondents by items in the Global Physical Activity Questionnaire (n=338) (cont.)

GPAQ items	Median (IQR) / n (%)		
	Male (n=106)	Female (n=232)	Total (n=338)
1-2 days	12 (20.7)	17 (13.8)	29 (16.0)
3-4 days	20 (34.5)	45 (36.6)	65 (35.9)
5-7 days	22 (37.9)	58 (47.2)	80 (44.2)
How much time do you spend walking or bicycling for travel on a typical day?	60 (30 – 120)	40 (30 – 90)	60 (30 – 113)
Recreational activity			
Do you do any vigorous intensity sports, fitness or recreational activities for at least 10 minutes/			
Yes	78 (73.6)	86 (37.1)	164 (48.5)
No	28 (26.4)	146 (62.9)	174 (51.5)
How many days spend on vigorous sports, fitness or recreational activities on a typical week?			
<1 days	7 (9.0)	26 (30.6)	33 (20.2)
1-2 days	25 (32.1)	44 (51.8)	69 (42.3)
3-4 days	28 (35.9)	12 (14.1)	40 (24.5)
5-7 days	18 (23.1)	3 (3.5)	21 (12.9)
How much time spend on vigorous sports, fitness or recreational activities on a typical day?	60 (30 – 120)	60 (30 – 120)	60 (30 – 120)
Do you do any moderate intensity sports, fitness or recreational activities for at least 10 minutes?			
Yes	67 (63.2)	100 (43.1)	167 (49.4)
No	39 (36.8)	132 (56.9)	171 (50.6)
How many days spend on moderate sports, fitness or recreational activities on a typical week?			
<1 days	12 (17.9)	30 (30.6)	42 (25.5)
1-2 days	22 (32.8)	46 (46.9)	68 (41.2)
3-4 days	24 (35.8)	12 (12.2)	36 (21.8)
5-7 days	9 (13.4)	10 (10.2)	19 (11.5)
How much time spend on moderate sports, fitness or recreational activities on a typical day?	60 (30 – 120)	37.50 (30 – 90)	60 (30 – 90)

Table 4.15: Distribution of respondents by items in the Global Physical Activity Questionnaire (n=338) (cont.)

GPAQ items	Median (IQR) / n (%)		
	Male (n=106)	Female (n=232)	Total (n=338)
Sedentary behavior			
How much time do you usually spend sitting or reclining on a typical day?	300 (120 – 480)	300 (180 – 600)	300 (180 – 540)

Table 4.16 shows the distribution of the physical activity level of the respondents by sex. The results showed that the median MET score of the total respondents was 2100 MET-min per week (*IQR*: 720 – 5880), with the median of MET score for male respondents was 4656 MET-min per week (*IQR*: 1650 – 9660) and 1560 MET-min per week (*IQR*: 480 – 4260) for female respondents. These results indicated that male respondents were more physically active compared to female respondents. Similarly, a study done by Uddin, Khan and Burton (2017) among 573 university students in Dhaka City, Bangladesh also reported that males (27%) were more physically active than females (6%). Physical activity level was classified into three categories, which were low, moderate and high. Overall, 42.6% of the respondents had high physical activity level.

Similarly, among male respondents, more than half of them (60.4%) had high physical activity, while more than one third of the female respondents (38.4%) had moderate physical activity level. A study conducted by Rajappan, Selvaganapathy and Liew (2015) among 100 university students also showed more than half of male respondents (56.0%) had high physical activity and 46.0% of the female respondents had moderate physical activity.

Table 4.16: Distribution of physical activity level of the respondents by sex

Variables	Median (IQR) / <i>n</i> (%)		
	Male (n=106)	Female (n=232)	All (n=338)
Physical activity	4656 (1650 – 9660)	1560 (480 – 4260)	2100 (720 – 5880)
Low	8 (7.5)	63 (27.2)	71 (21.0)
Moderate	34 (32.1)	89 (38.4)	123 (36.4)
High	64 (60.4)	80 (34.5)	144 (42.6)

4.4.2 Food Preoccupation

As shown in Table 4.17, the results showed that for frequency of thoughts about food subscale, 25.1% of the respondents agreed that they often found themselves thinking about food and only 7.7% of the respondents completely agreed that they did not think about food all that much. For positive emotional valence subscale, more than one third of the respondents (38.8%) agreed that they enjoyed planning what they are going to eat. However, 5.3% of the respondents completely disagreed that they think about food just for fun. For negative emotional valence subscale, most of the respondents (37.3%) agreed that they quite stressful while planning for meals. However, 30.5% of the respondents completely disagreed that thinking about food can put them in bad mood. For neutral emotional valence subscale, 23.7% of the respondents agreed that thinking about food not usually linked to any particular emotion. Most of the respondents (21.0%) also agreed that they did not pay much attention to thoughts about food. Meanwhile, 18.9% of the respondents disagreed that they did not particularly enjoy or dislike thinking about food.

Overall, the average score for frequency of thoughts about food subscale was 3.11 ($SD=0.73$), positive emotional valence subscale was 3.45 ($SD=0.67$), negative emotional valence subscale was 2.76 ($SD=0.72$) and neutral emotional valence was 3.05 ($SD=0.62$).

Table 4.17: Distribution of the respondents by items in the Food Preoccupation Questionnaire (n=338)

FPQ items	n (%)				
	Completely disagree	Disagree a bit	Neutral	Agree a bit	Completely agree
Frequency of thoughts about food					
1) I spend a lot of time thinking about food	20 (5.9)	48 (14.2)	158 (46.8)	84 (24.9)	28 (8.3)
3) I often find myself thinking about food	20 (6.0)	48 (14.3)	155 (46.3)	84 (25.1)	28 (8.4)
17) I don't think about food all that much	39 (11.5)	56 (16.6)	147 (43.5)	70 (20.7)	26 (7.7)
Mean ± SD	3.11 ± 0.73				
Min – Max	1 – 5				
Positive emotional valence					
5) I really enjoy myself thinking about food	13 (3.80)	39 (11.5)	116 (34.3)	123 (36.4)	47 (13.9)
8) I like thinking about my favourite food	16 (4.7)	29 (8.6)	103 (30.5)	116 (34.3)	74 (21.9)
10) I often look forward to my next meal	16 (4.7)	28 (8.3)	122 (36.4)	123 (36.4)	48 (14.2)
14) I love thinking about food	17 (5.0)	27 (8.0)	130 (38.5)	120 (35.5)	44 (13.0)
16) Sometimes I think about food just for the fun of it	18 (5.3)	29 (8.6)	138 (40.8)	112 (33.1)	41 (12.1)
19) I can get really excited thinking about food	17 (5.0)	33 (9.8)	136 (40.2)	105 (31.1)	47 (13.9)
21) Thinking about food can put me in a good mood	13 (3.8)	25 (7.4)	127 (37.6)	129 (38.2)	44 (13.0)
24) I enjoy deciding what to eat in a restaurant	17 (5.0)	37 (10.9)	135 (39.9)	106 (31.4)	43 (12.7)
26) I enjoy planning what I'm going to eat	12 (3.6)	26 (7.7)	123 (36.4)	131 (38.8)	46 (13.6)
Mean ± SD	3.45 ± 0.67				
Min – Max	1-5				
Negative emotional valence					
2) Planning meals can be quite stressful	20 (5.9)	39 (11.5)	105 (31.1)	126 (37.3)	48 (14.2)
6) I can get quite stressed if I start to think about food	62 (18.3)	82 (24.3)	107 (31.7)	74 (21.9)	13 (3.8)
7) I often struggle with thoughts about food	55 (16.3)	68 (20.1)	121 (35.8)	74 (21.9)	20 (5.9)
11) I hate being distracted with thoughts about food	45 (13.3)	58 (17.2)	132 (39.1)	81 (24.0)	22 (6.5)
13) I worry I spend too much time thinking about food	67 (19.8)	71 (21.0)	127 (37.6)	58 (17.2)	15 (4.4)
15) Thinking about food can put me in a bad mood	103 (30.5)	92 (27.2)	91 (26.9)	38 (11.2)	14 (4.1)
18) Deciding what to eat can be quite stressful	37 (10.9)	44 (13.0)	110 (32.5)	110 (32.5)	37 (10.9)

Table 4.17: Distribution of the respondents by items in the Food Preoccupation Questionnaire (n=338) (cont.)

FPQ items	n (%)				
	Completely disagree	Disagree a bit	Neutral	Agree a bit	Completely agree
22) I hate thinking about food	102 (30.2)	85 (25.2)	102 (30.2)	39 (11.5)	10 (3.0)
25) Thinking about food can make me quite miserable	79 (23.4)	68 (20.1)	135 (39.9)	49 (14.5)	7 (2.1)
Mean ± SD	2.76 ± 0.72				
Min – Max	1 – 5				
Neutral emotional valence					
4) My thoughts about food don't tend to me particularly pleasant or unpleasant	21 (6.2)	36 (10.7)	189 (55.9)	79 (23.4)	13 (3.8)
9) When I think about food it's not usually linked to any particular emotion	15 (4.4)	38 (11.2)	158 (46.8)	80 (23.7)	47 (13.9)
12) I don't particularly enjoy or dislike thinking about food	33 (9.8)	64 (18.9)	169 (50.0)	54 (16.0)	18 (5.3)
20) I don't pay much attention to thoughts about food	21 (6.2)	53 (15.7)	172 (50.9)	71 (21.0)	21 (6.2)
23) Thinking about food doesn't really excite or depress me	41 (12.1)	59 (17.5)	155 (45.9)	60 (17.8)	23 (6.8)
Mean ± SD	3.05 ± 0.62				
Min – Max	1 – 5				

4.4.3 Dietary Restraint

As shown in Table 4.18, 37.9% of the respondents reported that they diet sometimes. Two-third of the respondents (68.9%) showed that they lost 0-2.5 kg of their weight in a month. However, 35.5% of the respondents showed that they gained 0-0.5 kg weight in a week. More than one third of the respondents (38.2%) had weight fluctuation as much as 0.5-1.0 kg in a week.

Table 4.18: Distribution of the respondents by items in the Revised Restrained Scale (n=338)

RRS items	n (%)
How often are you dieting?	
Never	75 (22.2)
Rarely	95 (28.1)
Sometimes	128 (37.9)
Often	33 (9.8)
Always	7 (2.1)
What is the maximum amount of weight (in kilos) you have ever lost within 1 month?	
0-2.5	233 (68.9)
2.5-5.0	72 (21.3)
5.0-7.5	20 (5.9)
7.5-10.0	7 (2.1)
>10	6 (1.8)
What is the maximum amount of weight gain (in kilos) within a week?	
0-0.5	120 (35.5)
0.5-1.0	95 (28.1)
1.0-1.5	85 (25.1)
1.5-2.5	28 (8.3)
>2.5	10 (3.0)
In a typical week, how much does your weight fluctuate?	
0-0.5	127 (37.6)
0.5-1.0	129 (38.2)
1.0-1.5	70 (20.7)
1.5-2.5	11 (3.3)
>2.5	1 (0.3)
Would a weight fluctuation of 2.5 kilos affect the way you live your life?	
Not at all	94 (27.8)
Slightly	134 (39.7)
Moderately	71 (21.0)
Very much	39 (11.5)
Do you eat sensibly in front of others and binge alone?	
Never	80 (23.7)
Rarely	195 (57.7)
Often	54 (16.0)
Always	9 (2.7)
Do you give too much time and thought to food?	
Never	39 (11.5)
Rarely	194 (57.4)
Often	90 (26.6)
Always	15 (4.4)
Do you have feeling of guilt after overeating?	
Never	81 (24.0)

Table 4.18: Distribution of the respondents by items in the Revised Restrained Scale (n=338) (cont.)

RRS items	n (%)
Rarely	135 (40.0)
Often	88 (26.0)
Always	34 (10.1)
How conscious are you what you are eating?	
Not at all	28 (8.3)
Slightly	142 (42.0)
Moderately	141 (41.7)
Extremely	27 (8.0)
How many kilos over your desired weight were you at your maximum weight?	
0-0.5	78 (23.1)
0.5-3.0	116 (34.3)
3.0-5.0	80 (23.7)
5.0-10.0	32 (9.5)
>10.0	32 (9.5)

As shown in Table 4.19, the mean RRS score was 11.52 ($SD=4.84$), in which the mean score was slightly higher among male respondents (12.01 ± 5.17) compared to females (11.30 ± 4.67). The result showed that 24.3% of the respondents were reported to have high dietary restraint, with the prevalence was higher among male respondents (31.1%) compared to females (21.1%). However, this result was inconsistent with a previous study conducted by Schnettler et al. (2017) among university students in Chile showed that 52.8% of the students were having high dietary restraint, in which more females (31.0%) had higher dietary restraint compared to males (21.8%).

Table 4.19: Dietary restraint of the respondents by sex

Variable	Mean $\pm$ SD /n (%)		
	Male (n=106)	Female (n=232)	Total (n=338)
Dietary Restraint			
Low	73 (68.9)	183 (78.9)	256 (75.7)
High	33 (31.1)	49 (21.1)	82 (24.3)

4.5 PERSONAL FACTORS AND BINGE EATING BEHAVIOR

Pearson product-moment correlation test was performed to determine the correlations between age, year of study, Body Mass Index (BMI), waist circumference and body fat percentage and BEB. As shown in Table 4.20, BMI ($r=0.261, p<0.001$), waist circumference ($r=0.240, p<0.001$) and body fat percentage ($r=0.187, p=0.001$) were significantly correlated with BEB. However, age ($r=0.097, p=0.076$) and year of study ($r=0.039, p=0.472$) were not correlated with BEB.

The finding of this study was consistent with a previous study conducted by Vitolo, Bartolini and Horta (2005), in which age was not significantly correlated with BEB among university students ($p=0.499$). Vitolo et al. (2005) further found that BEB was significantly difference between age group by academic major such as health field and non-health field major, in which health field students aged below 20 years old had significantly greater ($p<0.01$) engagement with BEB compared to health field students aged above 20 years. Besides, the current study found no relationship between year of study and BEB, in which this finding was supported by Yu and Tan (2016).

Table 4.20: Association between age, years of study, BMI, waist circumference, body fat percentage and binge eating behavior

Variable	Binge eating behavior	
	<i>r</i>	<i>p</i> -value
Age	0.097	0.076
Year of study	0.039	0.472
Body Mass Index (BMI)	0.261**	<0.001
Waist circumference	0.240**	<0.001
Body fat percentage	0.187**	0.001

**Correlation is significant at $p<0.01$

This study showed that higher BMI increased the risk of BEB ($r=0.261, p<0.001$). A study done by Rosenbaum and White (2015) also showed the similar finding, in which there was a significant relationship between BMI and BEB ($r=0.320, p<0.001$). Likewise,

a recent study conducted by Thu et al. (2019) also found that BMI was correlated with BEB ($r=0.204$, $p<0.01$) among university students. Individuals with binge eating behavior usually showed high calorie consumption in all food groups except for vegetables and legumes (Bartholome et al., 2013; Silva et al., 2016). High consumption of energy dense food especially fats and sugars usually reported to be one of the stress coping methods among university students, which eventually lead to overweight and obesity (Gan et al., 2011; Khambalia & Seen; 2010).

This study showed that waist circumference was positively correlated with BEB ($r=0.240$, $p<0.001$). This indicated that individuals who engaged with BEB had high waist circumference. This result was supported by a previous study conducted by Succuro et al. (2015), which showed that individuals with BEB and being obesity had significantly ($p<0.001$) high waist circumference compared to non-binge eaters. Similarly, a recent local study done by Thu et al. (2019) also showed a significant relationship between waist circumference and BEB ($r=0.204$, $p<0.01$). The risk of binge eating cycles increased among individuals practicing unhealthy weight control behaviors such as dieting, which can induce depressive symptoms that can trigger glucocorticoid-mediated visceral obesity, thus, increase their waist circumferences (Chrousos, 2000; Smith et al., 1999).

This study also showed that body fat percentage was positively correlated with BEB ($r=0.187$, $p=0.001$). This indicated that university students with high body fat percentage had greater tendency to engage in BEB. This result was consistent with a study conducted by Adamus-Leach et al. (2012) which showed that body fat percentage was significantly correlated with BEB ($r=0.305$, $p<0.01$). Individuals with BEB tend to have high level of energy consumption that was positively correlated with body fat (Bowen et al., 2015; Thu

et al., 2019). In contrast, this result was contradicted with a previous study conducted by Berner et al. (2015), which showed that there was no relationship between body fat percentage and loss of control on food ($r=0.04, p>0.05$). Berner et al. (2015) explained that instead of total body fat percentage, high percentage of trunk fat especially abdominal fat was associated with loss control of eating development.

Chi-square test was performed to determine the associations between sex and living status with BEB among university students in this study. As shown in Table 4.21, results showed that there were no significant associations between sex ($\chi^2=2.48, p=0.115$) and living status ($p=0.173$) with BEB among university students. This study found that 33.0% males and 24.1% females were engaged in BEB. Contrary to this finding, a recent study conducted by Thu et al. (2019) reported that the prevalence of BEB was higher females (11.9%) compared to males (5.7%). However, there was no significant association between sex and BEB. Besides, previous studies also showed that female students were more likely to engage in BEB than male students (Kelly-Weeder, Jennings, & Wolfe, 2012). Similarly, a study conducted by Kelly-Weeder et al. (2013) also showed that more female students were engaged with BEB compared to male students. These findings were consistent with a previous study conducted by Sonnevile et al. (2013) among large cohort of adolescents and young adults between ages 16 and 24 years old also showed that binge eating behavior was common among females (2.3% to 3.1%) compared to males (0.3% to 1.0%). This is because females always associated with increased in psychological pressure that can lead to depressive symptoms which recognized as a predictor for onset of BEB (Skinner et al., 2012; Thu et al., 2019). This can be explained in part by guilt after overeating, which can result in an increase in depressive symptoms thus, initiated BEB as a means of coping with

negative emotions (Greeno et al., 1995; Meany et al., 2014; Skinner et al., 2012; Ten et al., 2019). In addition, females were more likely reported stress, negative emotions and feeling guilty after overeating (Phillips et al., 2016; Skinner et al., 2012).

Table 4.21: Associations between sex and living status with binge eating behavior

Variable	n (%)		χ^2	p-value
	Non BEB (n=247)	BEB (n=91)		
Sex			2.48	0.115
Male	71 (67.0)	35 (33.0)		
Female	176 (75.9)	56 (24.1)		
Living status			Fisher's Exact Test	0.173
Away from family	237 (73.8)	84 (26.2)		
With family	10 (58.8)	7 (41.2)		

This study found that no association between living status and BEB among university students ($p=0.173$). The prevalence of BEB among students who live away from family and with family was 26.2% and 41.2%, respectively. However, this result was contradicted with a previous study conducted by Barker and Galambos (2007) as the study showed that living status was significantly associated with BEB. They found that university students who lived far away from family were more likely to develop BEB compared to those who were living with their family. This is because university students usually have hard time to adjust with the living environment as they need to learn to be independent and also to adjust with hurried university lifestyle, which can trigger BEB as one of the coping methods (Barker & Galambos, 2007). No significant association between living status and BEB was found in the present study might be due to the low percentage of students who lived with their family (5.0%). Almost all of the students in this study stayed in college dormitories or stayed out-campus with friends (95.0%).

4.6 PSYCHOLOGICAL FACTORS AND BINGE EATING BEHAVIOR

As shown in Table 4.22, Pearson product-moment correlation test was performed to determine correlations between body image perception, depression, self-esteem and social physique anxiety with BEB. Body image perception was positively correlated with BEB ($r=0.247, p<0.001$) in this study. This indicated that university students with higher body dissatisfaction have higher tendency to engage in BEB. Similarly, a previous study conducted by Lofrano-Prado (2015) among 408 college students showed that body dissatisfaction was positively correlated with BEB ($r=0.728, p<0.001$). Another study conducted by O'Connor et al. (2017) among 631 females aged 10-28 years old also showed a positive correlation between body dissatisfaction and BEB ($r=0.45, p<0.001$). This is because body dissatisfaction usually will foster dieting behavior in order to get the desired body shape, however, the disturbance in dieting effort can lead to BEB (Fairburn, Cooper & Shafron, 2003; Fairburn & Wilson, 1999).

Table 4.22: Association between psychological factors and binge eating behavior

Variable	Binge eating behavior	
	<i>r</i>	<i>p</i> -value
Body image perception	0.247**	<0.001
Depression	0.220**	<0.001
Self-esteem	-0.179**	0.001
Social physique anxiety	0.282**	<0.001

**Correlation is significant at $p<0.01$

It was found that there was a significant positive correlation between depression and BEB ($r=0.220, p<0.001$) among university students in this study. This indicated that university students with depression have higher risk to develop BEB. This finding was further supported by other studies in South Korea (Shin & Yi, 2014) and United Arab Emirates (Schulte, 2016). University students were prone to depression and suffered from

severe emotional maladjustment which can trigger the students to binge eating as a coping method in order to help them to relieve the negative emotions (Jang & Kang, 2018; Schulte, 2016).

Self-esteem was negatively and weakly correlated with BEB ($r=-0.179$, $p=0.001$) in this study. This indicated that university students with low self-esteem were prone to binge eating. This result was consistent with a previous study conducted by Andrea et al. (2016). Individuals with low self-esteem always associated with feelings of worthlessness and negative thoughts that triggered them to engage in BEB in order to help them to cope with the aversive emotional states (Albrecht, 2014; Gordon et al. 2012).

Furthermore, this study found that there was a significant relationship between social physique anxiety and BEB ($r=0.282$, $p<0.001$). This indicated that the higher the social physique anxiety, the higher the tendency to engage in BEB. Such significant result is consistently shown in other studies (De Boer et al., 2012; Levinson et al., 2013). Social physique anxiety can develop social comparison attitude to relieve anxiety; however, this behavior can increase the tendency to develop BEB once social comparison failed to reassure the individual about their body (Fitzsimmons-Craft et al., 2012). In contrast, this finding was contradicted with a study conducted by Ostrovsky et al. (2013), in which the study showed that there was no significant association between social physique anxiety and BEB. This is because individuals with high social physique anxiety tend to engage in body checking behavior; thus, it is less likely for them to binge eat as the consequences of weight gain is obvious (Haase et al., 2007; Ostrovsky et al., 2013).

4.7 BEHAVIORAL FACTORS AND BINGE EATING BEHAVIOR

As shown in Table 4.23, Spearman’s rho correlation test was performed to determine the correlation between physical activity and BEB. It was found that there was no significant correlation between physical activity and BEB ($r_s=0.001, p=0.979$). Contrary to this finding, Silva et al. (2016) showed that physical activity was significantly associated with BEB. They explained that individuals with binge eating was physically inactive due to self-perpetuating myth cycle of binge eating (Silva et al., 2016).

Table 4.23: Association between physical activity and binge eating behavior

Variable	Binge eating behavior	
	r_s	p -value
Physical activity	0.001	0.979

* r_s = Spearman’s rho

Based on Table 4.24, Pearson product-moment correlation test was performed to determine the relationships between food preoccupation and dietary restraint with BEB. It was found that there were significant relationships between frequency of thoughts about food ($r=0.238, p<0.001$) and negative emotional valence of thoughts ($r=0.306, p<0.001$) with BEB. This indicated that frequent thinking about food and higher negative emotional valence of thoughts could increase the risk of binge eating among university students. A previous study conducted by Tapper and Pothos (2010) showed similar results, in which frequency of thoughts ($r=0.44, p<0.001$) and negative emotional valence ($r=0.47, p<0.001$) were significantly correlated with BEB. They explained that frequency of thoughts was significantly correlated with negative emotion especially due to sense of deficit of desired of food. In addition, individuals with negative emotion were less likely to cope with their emotion thus trigger the eating disorder symptomatology and started to engage in BEB (Diegemans et al., 2009; Tapper & Pothos, 2010).

This study showed that positive and neutral emotional valence were not significantly correlated with BEB. Consistent finding was shown in the study of Tapper and Pothos (2010). Negative emotion is more strongly associated with BEB compared to positive emotion as positive emotion is more likely to be correlated with hedonic eating that can enhance the pleasure with food (Macht et al., 2002; Sultson, Kukk & Akkermann, 2017).

Table 4.24: Relationships between food preoccupation and dietary restraint with binge eating behavior

Variables	Binge eating behavior	
	<i>r</i>	<i>p</i> -value
Food preoccupation		
Frequency of thoughts about food	0.238**	<0.001
Positive emotional valence	0.055	0.311
Negative emotional valence	0.306**	<0.001
Neutral emotional valence	0.062	0.257
Dietary restraint	0.344**	<0.001

**Correlation is significant at *p*<0.01

Dietary restraint was positively correlated with BEB (*r*=0.344, *p*<0.001) in this study. This indicated that university students with higher dietary restraint had higher risk of BEB. A previous study conducted by Woods, Racine and Klump (2010) among Midwestern undergraduate students also showed the similar finding, in which there was a significant positive correlation between dietary restraint and BEB (*r*=0.43, *p*<0.01). Similarly, a recent study done by Mason et al. (2018) among 556 undergraduate female students at a Mid-Atlantic university in USA also reported that dietary restraint was significantly related to BEB (*r*=0.32, *p*<0.001). One of the possible reasons might be that when individuals with dietary restraint exposed to negative affect, this could disrupt their dietary vigilance and triggered the engagement with BEB (Mason et al., 2016).

CHAPTER 5

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

5.1 CONCLUSION

This present study showed a high prevalence of binge eating behavior among university students, in which 27.2% of the university students engaged with binge eating behavior with 23.4% and 3.8% of them were moderately and severely binge eating, respectively. The prevalence of binge eating behavior was higher in male respondents (33.9%) compared females (24.1%). Besides, 25.8% of the students were overweight/obese and 15.4% had abdominal obesity. One third of them (34.0%) had high body fat percentage. Three in four of the university students (77.2%) were dissatisfied with their body size, in which more males (43.4%) desired to have a larger body size while more females (47.0%) desired for a smaller body size. Half of the university students (55.3%) reported to have depressive symptoms and 24.3% of them engaged in dietary restraint. In addition, 21.0% of the students had low physical activity level.

Bivariate results showed that being overweight/obese, abdominal obese, high body fat percentage, depressive symptoms, body dissatisfaction, high social physique anxiety, low self-esteem, frequent thinking about food, negative emotional valence, and high dietary restraint were associated with higher risk of binge eating behavior. This study showed that university students have higher tendency to develop binge eating behavior.

Thus, the identified significant associated factors should be given more attention in order to reduce the prevalence of BEB and to encourage healthy eating behaviors among university students.

5.2 LIMITATIONS OF THE STUDY

There are some limitations of this study that should be considered in order to improve the accuracy of the results. Firstly, a cross-sectional study design was used in this study. Therefore, this study could not show the causal-effect relationship between personal factors, psychological factors and behavioral factors with binge eating behavior. Secondly, this study was conducted among university students in UPM only. Therefore, the findings of this study could not be generalized to all university students in Malaysia. Lastly, a set of self-administered questionnaire was used in this study. Thus, there is a very high possibility of under reporting or over reporting from the respondents.

5.3 RECOMMENDATIONS

There are some recommendations that could be suggested for nutritionists and further research implementations. Firstly, it is important to prevent binge eating behavior among university students as it can help to prevent further development towards more serious eating disorders and other health implications. This can be done by conducting appropriate nutrition interventions by emphasizing the promotion of healthy eating behaviors among university students.

Besides, nutritionists or health professionals can educate and guide university students on proper weight management by focusing on healthy eating and active lifestyle.

Counseling sessions should be provided to students in order to promote positive body image, cope with depression, improve self-esteem and control their social physique anxiety. In addition, it is recommended to conduct the study on university students from both public and private universities in order to have a better understanding on BEB among university students. Besides, cohort studies should be conducted in the future to determine causal-effect relationships between personal, psychological and behavioral factors with binge eating behavior.

Lastly, it is also recommended for future studies to include other factors that focusing on sociocultural factor such as social support, peer influence, parental influence, mass media and social comparison (Al-sheyab, Gharaibeh & Kheirallah, 2018; Mason & Lewis, 2017).

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APPENDIX A

Ethics approval letter from JKEUPM

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

Research title	: Factors Associated with Binge Eating Behavior Among Undergraduate Students in Universiti Putra Malaysia
Study Site	: UPM
JKEUPM Ref No.	: JKEUPM-2018-336
Researcher	: Nor Lailatul Hidayah binti Agus Salim
Supervisor	: Dr. Gan Wan Ying

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 25/10/2018
2. Respondent Information Sheet & Consent (English), Version 2 dated 13/11/2018
3. Proposal (English), Version 1 dated 25/10/2018
4. Questionnaires/ Interviews (English), Version 1 dated 25/10/2018
5. Curriculum Vitae of:
 - a. Dr. Gan Wan Ying

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

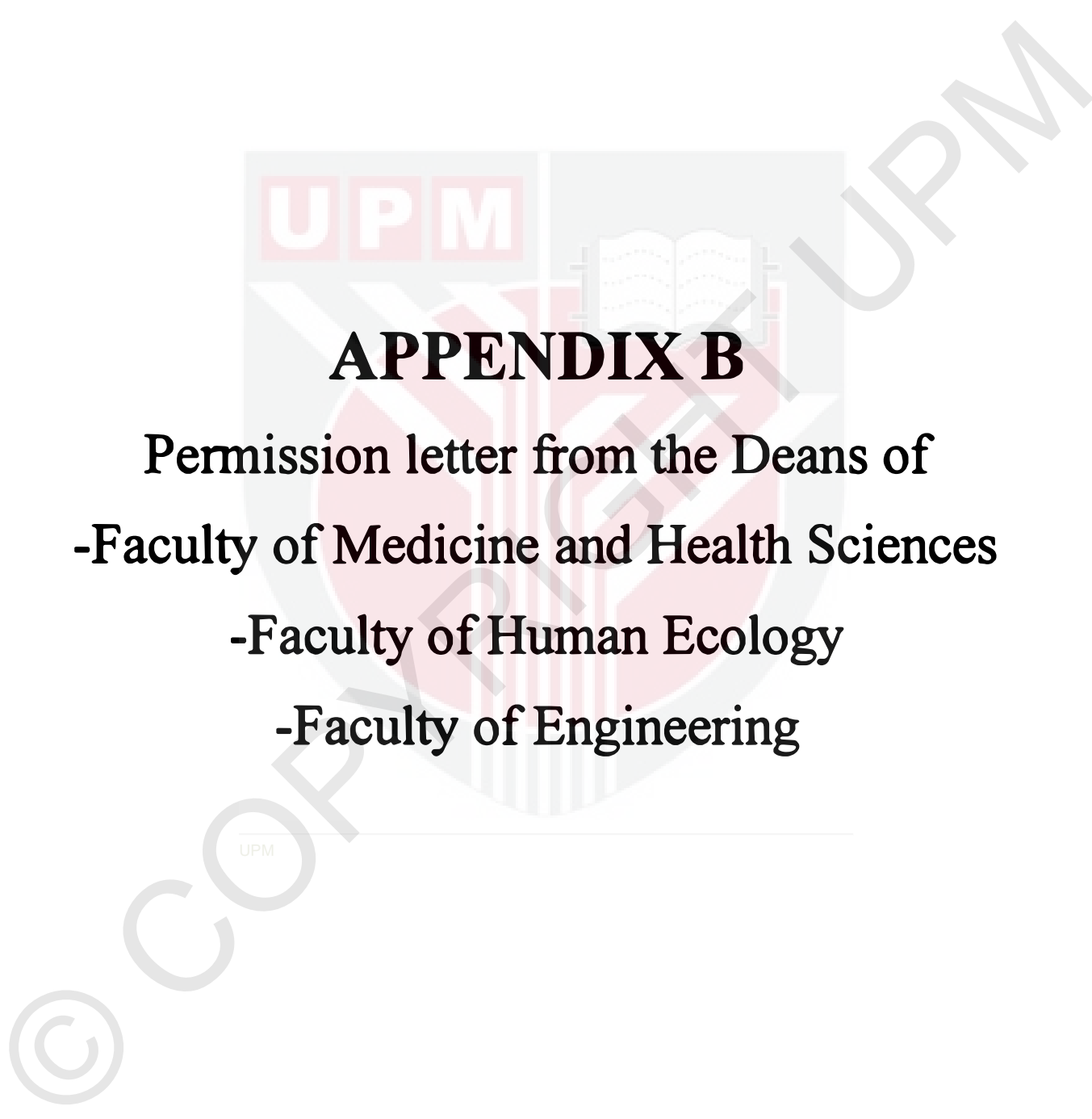
Decision by JKEUPM:

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

Please note that the approval is **VALID UNTIL 17 NOVEMBER 2019**

Researchers should comply with the following:

- I. Complete a Study Final Report upon study completion (Form 3.2).
- II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.
- III. Applicable for Clinical Trial Studies and Clinical interventional Studies only: Progress Report has to be submitted to JKEUPM at every 6 months from the date of approval (Form 3.1). Report occurrences of all Serious Adverse Events (SAEs), Suspected Unexpected Serious Adverse Reaction (SUSARs) and Protocol Deviation/ Violation at all JKEUPM approved sites to

The image features a large, light gray watermark of the UPM logo, which includes a shield with a book and the letters 'UPM', and a large '©' symbol. The text 'UPM' is also visible in a small box within the shield.

APPENDIX B

Permission letter from the Deans of
-Faculty of Medicine and Health Sciences
-Faculty of Human Ecology
-Faculty of Engineering

APPENDIX C
Information Sheet and Consent Form



UPM
UNIVERSITI PUTRA MALAYSIA

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

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

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

1. STUDY TITLE :

FACTORS ASSOCIATED WITH BINGE EATING BEHAVIOR AMONG UNDERGRADUATE STUDENTS IN UNIVERSITI PUTRA MALAYSIA.

2. INTRODUCTION:

Binge eating behavior is an abnormal eating behavior that can be observed through several characteristics, which are rapidly eating large amount of food, continuously eating even no longer feeling hungry until feeling uncomfortably full, eating alone and secretly due to feeling of embarrassment. Binge eating behavior is common among university students due to hard time to adjust with new environment and encounter with new challenges in university life. Engagement with binge eating behavior can cause several health and medical implications such as weight gain, psychological problem, hypertension, abnormal blood lipid level and Type 2 diabetes. Therefore, this study aims to determine the factors (personal factors, psychological factors and behavioral factors) associated with binge eating behavior among university 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, Universiti Putra Malaysia, which is expected to be completed within a year. A total of 330 undergraduate students from Universiti Putra Malaysia will participate in this study.

3. WHAT WILL YOU HAVE TO DO?

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

Things that you need to do are as follows;

1. Complete a questionnaire consisting of personal factors, psychological factors and behavioral factors. After completing the questionnaire, return it to the researcher.
2. Your height, weight, body fat percentage and waist circumference will be measured by researcher in a closed room.

Your participation in this study will take approximately 30 minutes. Your participation in this

study is voluntary. You have the right to withdraw from this study at any time without giving any reasons and no penalty will be applied upon your withdrawal.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

Students who are international students, foundation or postgraduate students, physically disabled and students who are pregnant.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

You will get information on your weight, height, body fat percentage and waist circumference. Once you have successfully completed this study, a stationary will be given to you as a token of appreciation for your participation in this study.

(b) TO THE INVESTIGATOR?

Investigator able to know the prevalence of binge eating behavior and its associated factors among university students. Findings of this study could serve as baseline data for future research and it also could given an information for health professionals to develop and conduct health promotion programs to promote healthy eating behaviors among university students.

6. WHAT ARE THE POSSIBLE RISKS?

This study has very minimal risk where it only involves measurements on weight, height, body fat percentage, waist circumference and filling up the 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 part 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:

Nor Lailatul Hidayah binti Agus Salim

017-7666540

lhidayah915@gmail.com

Department of Nutrition and Dietetics,
Faculty of Medicine and Health Sciences,
Universiti Putra Malaysia, 43400,
Serdang, Selangor

Supervisor

Dr. Gan Wan Ying

012-3564362

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/vocal recordings related to me be used in
any form of publication or presentation (If applicable)

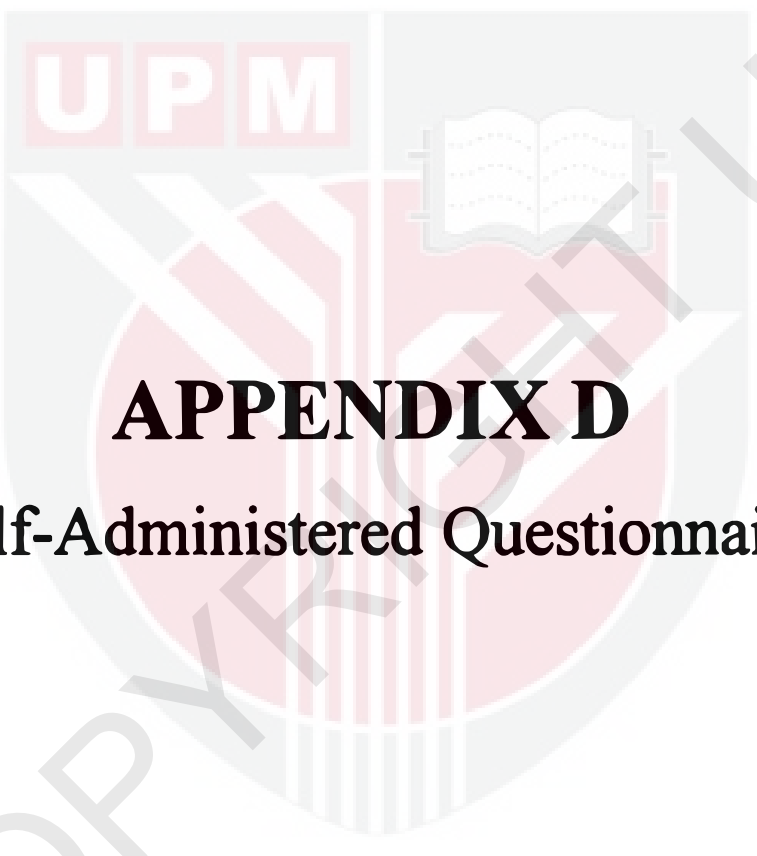
* delete where necessary

Signature Signature
(Respondent) (Witness)

Date :..... Name :.....
UPM I/C No. :.....

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

Date Signature
(Researcher)

The logo of Universiti Putra Malaysia (UPM) is a shield-shaped emblem. It features a red and white striped design with a central white cross. Above the cross, the letters 'UPM' are displayed in white on a red background. Below the cross, there is a white book icon. The entire logo is set against a light gray background.

APPENDIX D

Self-Administered Questionnaire

Reference No.



**FACULTY OF MEDICINE AND HEALTH SCIENCES
DEPARTMENT OF NUTRITION AND DIETETICS**

PKK 4999

Final Year Project

**FACTORS ASSOCIATED WITH BINGE EATING BEHAVIOR AMONG
UNDERGRADUATE STUDENTS IN UNIVERSITI PUTRA MALAYSIA**

Questionnaire

Researcher:

Nor Lailatul Hidayah Bt Agus Salim (184093)

Supervisor:

Dr Gan Wan Ying

Date of data collection:

Disclaimer: Any data collected in this survey will be treated as confidential information

PART A

Instruction: Please fill in the following personal information:

1. Age : _____ years
2. Date of birth : ____/____/____ (dd/mm/yy)
3. Sex :
☐ Male ☐ Female
4. Ethnicity
☐ Malay ☐ Indian
☐ Chinese ☐ Bumiputera Sabah
☐ Bumiputera Sarawak ☐ Others: _____
5. Religion :
☐ Islam ☐ Buddha ☐ Hindu ☐ Christian ☐ Other: _____
6. Faculty : _____
7. Programme : _____
8. Year of study : _____
9. Accommodation :
☐ College/Residence ☐ Home
☐ Outside campus ☐ Others, please specify: _____
10. Monthly allowance: RM _____

PART B

Instruction: Below are groups of statements about behaviour, thoughts, and emotional states. Please indicate which statement in each group best describes how you feel by ticking (✓) in the small box provided.

1.	
☐	I don't feel self-conscious about my weight or body size when I'm with others.
☐	I feel concerned about how I look to others, but it normally does not make me feel disappointed with myself.
☐	I do get self-conscious about my appearance and weight which makes me feel disappointed in myself.
☐	I feel very self-conscious about my weight and frequently, I feel intense shame and disgust for myself. I try to avoid social contacts because of my self-consciousness.

2.	
☐	I don't have any difficulty eating slowly in the proper manner.
☐	Although I seem to "gobble down" foods, I don't end up feeling stuffed because of eating too much food.
☐	At times, I tend to eat quickly and then, I feel uncomfortably full afterwards.
☐	I have the habit of bolting down my food, without really chewing it. When this happens I usually feel uncomfortably stuffed because I've eaten too much.

3.	
☐	I feel capable to control my eating urges when I want to.
☐	I feel like I have failed to control my eating more than the average person.
☐	I feel utterly helpless when it comes to feeling in control of my eating urges.
☐	Because I feel so helpless about controlling my eating I have become very desperate about trying to get in control.

4.	
☐	I don't have the habit of eating when I'm bored.
☐	I sometimes eat when I'm bored, but often I'm able to "get busy" and get my mind off food.
☐	I have a regular habit of eating when I'm bored, but occasionally, I can use some other activity to get my mind off eating.
☐	I have a strong habit of eating when I'm bored. Nothing seems to help me break the habit.

5.	
☐	I'm usually physically hungry when I eat something.
☐	Occasionally, I eat something on impulse even though I really am not hungry.
☐	I have the regular habit of eating habit of eating foods that I might not really enjoy, to satisfy a hungry feeling even though physically, I don't need the food.
☐	Even though I'm not physically hungry, I get a hungry feeling in my mouth that only seems to be satisfied when I eat a food, like a sandwich, that fills my mouth. Sometimes, when I eat the food to satisfy my mouth hunger, I then spit the food out so I won't gain weight.

6.	
	I don't feel any guilt or self-hate after overeat.
	After I overeat, occasionally I feel guilt or self-hate.
	Almost all the time I experience strong guilt or self-hate after I overeat.

7.	
	I don't lose total control of my eating when dieting even after periods when I overeat.
	Sometimes when I eat a "forbidden food" on a diet, I feel like I "blew it" and eat even more.
	Frequently, I have the habit of saying to myself, "I've blown it now, why not go all the way" when I overeat on a diet. When that happens I eat even more.
	I have a regular habit of starting strict diet for myself, but I break the diets by going on an eating binge. My life seems to be either a "feast" or "famine".

8.	
	I rarely eat so much food that I feel uncomfortably stuffed afterwards.
	Usually about once a month, I eat such a quantity of food, I end up feeling very stuffed.
	I have regular periods during the month when I eat large amounts of food, either at mealtime or at snacks.
	I eat so much food that I regularly feel quite uncomfortable after eating and sometimes a bit nauseous.

9.	
	My level of calorie intake does not go up very high or go down very low on a regular basis.
	Sometimes after I overeat, I will try to reduce my caloric intake to almost nothing to compensate for the excess calories I've eaten.
	I have a regular habit of overeating during the night. It seems that my routine is not to be hungry in the morning but I overeat in the evening.
	In my adult years, I have had week-long periods where I practically starve myself. This follows periods when I overeat. It seems I live a life of either "feast" or "famine".

10.	
	I usually am able to stop eating when I want to. I know when "enough is enough".
	Every so often, I experience a compulsion to eat which I can't seem to control.
	Frequently, I experience strong urges to eat which I seem unable to control, but at other times I can control my eating urges.
	I feel incapable of controlling urges to eat. I have a fear of not being able to stop eating voluntarily.

11.	
	I don't have any problem stopping eating when I feel full.
	I usually can stop eating when I feel full but occasionally overeat leaving me feeling uncomfortably stuffed.
	I have a problem stopping eating once I start and usually I feel uncomfortably stuffed after I eat a meal.
	Because I have a problem not being able to stop eating when I want, I sometimes have to induce vomiting to relieve my stuffed feeling.

12.	
	I seem to eat just as much when I'm with others (family, social gatherings) as when I'm by myself.
	Sometimes, when I'm with other persons, I don't eat as much as I want to eat because I'm self-conscious about my eating.
	Frequently, I eat only a small amount of food when others are present, because I'm very embarrassed about my eating.
	I feel so ashamed about overeating that I pick times to overeat when I know no one will see me. I feel like a "closet eater".

13.	
	I eat three meals a day with only an occasional between meal snacks.
	I eat 3 meals a day, but I also normally snack between meals.
	When I am snacking heavily, I get in the habit of skipping regular meals.
	There are regular periods when I seem to be continually eating, with no planned meals.

14.	
	I don't think much about trying to control unwanted eating urges.
	At least some of the time, I feel my thoughts are pre-occupied with trying to control my eating urges.
	I feel that frequently I spend much time thinking about how much I ate or about trying not to eat anymore.
	It seems to me that most of my waking hours are pre-occupied by thoughts about eating or not eating. I feel like I'm constantly struggling not to eat.

15.	
	I don't think about food a great deal.
	I have strong cravings for food but they last only for brief periods of time.
	I have days when I can't seem to think about anything else but food.
	Most of my days seem to be pre-occupied with thoughts about food. I feel like I live to eat.

16.	
	I usually know whether or not I'm physically hungry. I take the right portion of food to satisfy me.
	Occasionally, I feel uncertain about knowing whether or not I'm physically hungry. At these times it's hard to know how much food I should take to satisfy me.
	Even though I might know how many calories I should eat, I don't have any idea what is a "normal" amount of food for me.

PART C

Instruction: This section is to assess your body image perception. Body image perception is used to illustrate how individuals evaluate own body shape and appearance. Please complete this section by following the instructions given below.

- A. Refer to the nine male and female contour drawings of graduated sizes which are labelled as Current (refer to page number 6).

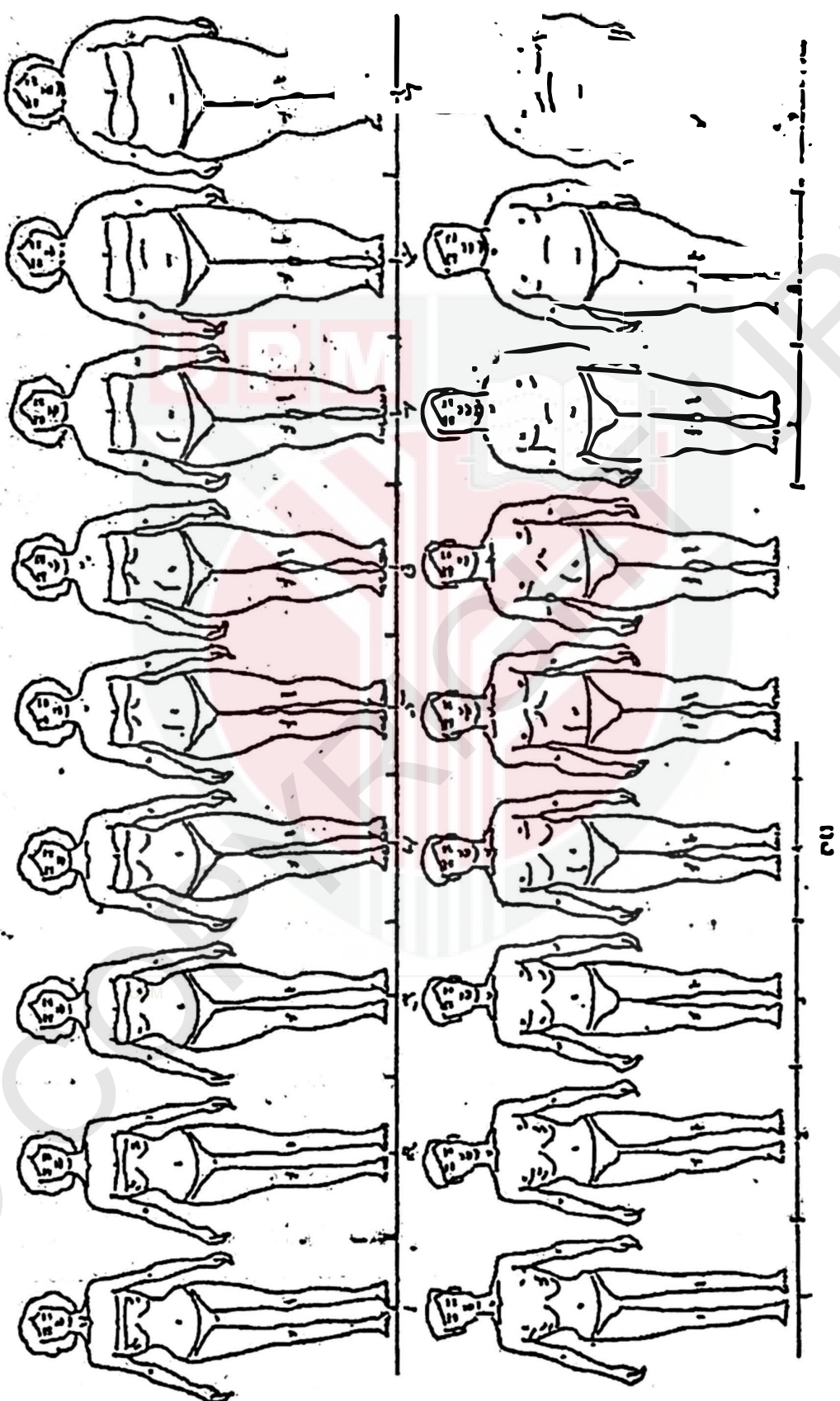
You are required to place a mark (X) on the body shape that presents your current figure.

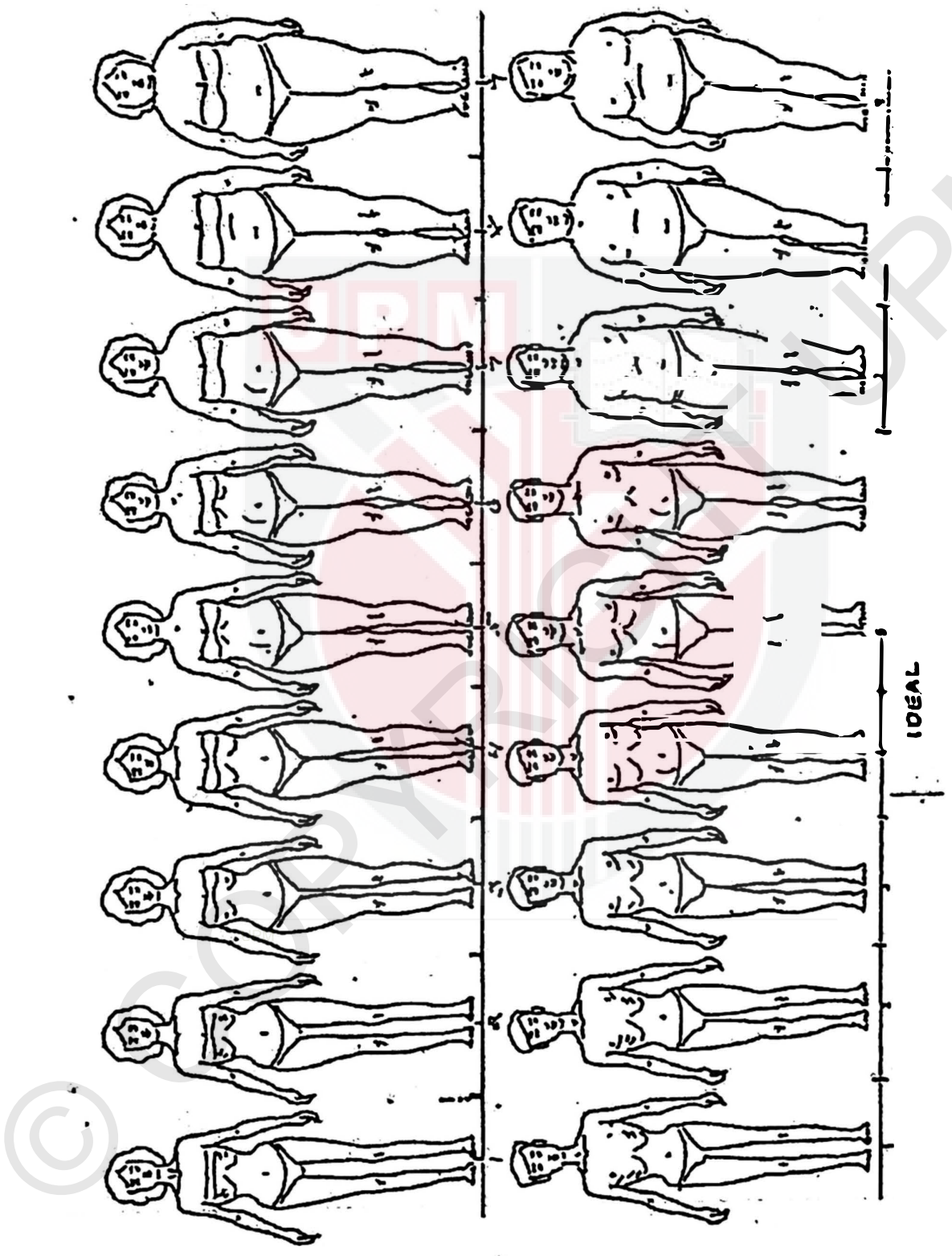
After this, you are required to place a mark (X) on the body shape that presents current figure of opposite sex.

- B. Refer to the nine male and female contour drawings of graduated sizes which are labelled as Ideal (refer to page number 7).

You are required to place a mark (X) on the body shape that presents your ideal figure.

After this, you are required to place a mark (X) on the body shape that presents ideal figure of opposite sex.





PART D

Instruction: Below is a list of statements dealing with your general feelings about yourself. Indicate how you feel about each statement by ticking (✓) in the box.

		0	1	2	3
		Strongly agree	Agree	Disagree	Strongly disagree
No.	ITEMS	0	1	2	3
1.	On the whole, I am satisfied with myself.				
2.	At times I think I am no good at all.				
3.	I feel that I have a number of good qualities.				
4.	I am able to do things as well as most other people.				
5.	I feel I do not have much to be proud of.				
6.	I certainly feel useless at times.				
7.	I feel that I'm a person of worth, at least on an equal plane with others.				
8.	I wish I could have more respect for myself.				
9.	All in all, I am inclined to feel that I am a failure.				
10.	I take a positive attitude toward myself.				

PART E

Instruction: Read each item carefully and indicate how characteristic it is of you according to the following scale by ticking (✓) in the box.

		1	2	3	4	5
		Not at all	Slightly	Moderately	Very	Extremely
No	ITEMS	1	2	3	4	5
1.	I am comfortable with the appearance of my physique or figure.					
2.	I would never worry about wearing clothes that might make me look too thin or overweight.					
3.	I wish I wasn't so up-tight about my physique or figure.					
4.	There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively.					
5.	When I look in the mirror I feel good about my physique or figure.					
6.	Unattractive features of my physique or figure make me nervous in certain social settings.					
7.	In the presence of others, I feel apprehensive about my physique or figure.					
8.	I am comfortable with how fit my body appears to others.					
9.	It would make me uncomfortable to know others were evaluating my physique or figure.					
10.	When it comes to displaying my physique or figure to others, I am a shy person.					
11.	I usually feel relaxed when it's obvious that others are looking at my physique or figure.					
12.	When in a bathing suit, I often feel nervous about how well-proportioned my body is.					

PART F

Instruction: Below is a list of some of the ways you may have felt or behaved. Please indicate how often you have felt this way during the past 7 days by ticking (√) in the box.

		0 < 1 day	1 1-2 days	2 3-4 days	3 5-7 days
No.	ITEMS	0	1	2	3
1.	I was bothered by things that usually don't bother me.				
2.	I had trouble keeping my mind on what I was doing				
3.	I felt depressed				
4.	I felt that everything I did was an effort				
5.	I felt hopeful about the future				
6.	I felt fearful				
7.	My sleep was restless				
8.	I was happy				
9.	I felt lonely				
10.	I could not "get going".				

PART G

Instruction: We are interested to know the amount of 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, etc.

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	Responds	Code
Work		
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	P1
In a typical week, on how many days do you do vigorous intensity activities as part of your work?	Number of days ____	P2
How much time do you spend doing vigorous-intensity activities at work on a typical day?	Hours : minutes ____ ; ____	P3 (a-b)

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	P4
In a typical week, on how many days do you do moderate intensity activities as part of your work?	Number of days _____	P5
How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours : minutes [] : []	P6 (a-b)
Travel to and from places		
<i>The next questions exclude the physical activities at work that you have already mentioned. Now we 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, etc.</i>		
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	P7
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 _____	P8
How much time do you spend walking or bicycling for travel on a typical day?	Hours : minutes [] : []	P9 (a-b)
Recreational Activity		
<i>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, etc.)</i>		
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	P10

In a typical week, on how many days do you do vigorous intensity sports, fitness or recreational (leisure) activities?	Number of days ____	P11
How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours : minutes ____ : ____	P12 (a-b)
Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause 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 P 16	P13
In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities?	Number of days ____	P14
How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?	Hours : minutes ____ : ____	P15 (a-b)
Sedentary behaviour		
<i>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, traveling in car, bus, train, reading, playing cards or watching television, but do not include time spent sleeping.</i>		
How much do you usually spend sitting or reclining on a typical day?	Hours : minutes ____ : ____	P16 (a-b)

PART H

Instruction: Below is a list of thoughts towards food. Please indicate how your thoughts about food by ticking (✓) in the box.

	1	2	3	4	5	
	Completely disagree	Disagree a bit	Neutral	Agree a bit	Completely agree	
No	ITEMS	1	2	3	4	5
1.	I spend a lot of time thinking about food					
2.	Planning meals can be quite stressful					
3.	I often find myself thinking about food					
4.	My thoughts about food don't tend to me particularly pleasant or unpleasant					
5.	I really enjoy myself thinking about food					
6.	I can get quite stressed if I start to think about food					
7.	I often struggle with thoughts about food					
8.	I like thinking about my favourite food					
9.	When I think about food it's not usually linked to any particular emotion					
10.	I often look forward to my next meal					
11.	I hate being distracted with thoughts about food					
12.	I don't particularly enjoy or dislike thinking about food					
13.	I worry I spend too much time thinking about food					
14.	I love thinking about food					
15.	Thinking about food can put me in a bad mood					
16.	Sometimes I think about food just for the fun of it					
17.	I don't think about food all that much					
18.	Deciding what to eat can be quite stressful					
19.	I can get really excited thinking about food					
20.	I don't pay much attention to thoughts about food					
21.	Thinking about food can put me in a good mood					
22.	I hate thinking about food					
23.	Thinking about food doesn't really excite or depress me					
24.	I enjoy deciding what to eat in a restaurant					
25.	Thinking about food can make me quite miserable					
26.	I enjoy planning what I'm going to eat					

PART I

Instruction: Below are the list of questions on concern about dieting and weight fluctuations. Circle your answer.

1. How often are you dieting?

NeverRarelySometimesOftenAlways
2. What is the maximum amount of weight (in kilos) you have ever lost within 1 month?

0-2.52.5-5.05-7.57.5-10>10
3. What is the maximum amount of weight gain (in kilos) within a week?

0-0.50.5-11-1.51.5-2.5>2.5
4. In a typical week, how much does your weight fluctuate?

0-0.50.5-11-1.52.5-2.5>2.5
5. Would a weight fluctuation of 2.5 kilos affect the way you live your life?

Not at allSlightlyModeratelyVery much
6. Do you eat sensibly in front of others and binge alone?

NeverRarelyOftenAlways
7. Do you give too much time and thought to food?

NeverRarelyOftenAlways
8. Do you have feeling of guilt after overeating?

NeverRarelyOftenAlways
9. How conscious are you what you are eating?

Not at allSlightlyModeratelyExtremely
10. How many kilos over your desired weight were you at your maximum weight?

0-0.50.5-33-55-10>10

PART J: ANTHROPOMETRY MEASUREMENTS (fill in by researcher)

Anthropometry measurement	Reading 1	Reading 2	Average
Height (cm)			
Weight (kg)			
Waist circumference (cm)			
Percentage of body fat (%)			