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Gender Differences in Body Image, Body Mass Index and Dietary Intake among University Students

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ABSTRACT

Body image dissatisfaction has shown to play a role in weight control and leads to an imbalance of energy and nutrient intakes. This study aims to determine gender differences in body image and its association with Body Mass Index (BMI) and dietary intakes among university students. A total of 100 university students were recruited. Body image was assessed by Body Shape Questionnaire and Figure Rating Scale. Dietary intake was assessed by meal practices and 3 days of dietary recall. All statistical data were analysed by SPSS. About 80% of females wished to be thinner and 28% of males wished to be fatter. The prevalence of body image dissatisfaction in this study was 89%. Participants who were dissatisfied with their body image had a significantly higher body image concern (mean score 82.24 ± 27.17) than body image satisfied group (59.64 ± 13.28). There was a significant positive correlation between BMI and body shape questionnaire score ($r = 0.306$; $p = 0.002$). The mean BMI in the body image dissatisfied group (22.07 ± 3.53 kg/m^2) was significantly higher than the satisfied group (20.97 ± 1.27 kg/m^2). Females who had body image dissatisfaction seldom snack whereas females who had satisfied body image always snack in between meals. There were gender differences in energy and nutrient intakes. Majority of the students did not meet the Malaysian Recommended Nutrient Intakes (RNI). The findings highlight the need for nutrition interventions with a focus on weight management and healthy eating

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patterns to promote positive body image among university students.

Keywords: Body image dissatisfactions, body image perceptions, body mass index, dietary intakes, university students

INTRODUCTION

Body image is defined as the perception of a person on his/her own physical appearance (Grogan, 2006). The components of body image can be divided into body shape concern, body weight perception, and body shape perception. Body image satisfaction is distinguished by undistorted body image with realistic perception and acceptance towards an individual's body shape and size (Wong & Say, 2013). On the contrary, body image dissatisfaction is having a distorted body image with shame, concern or disappointment about a person's look and normally have an unrealistic perception of their body shape and size (Wong & Say, 2013).

Obesity has become a major nutritional problem in Malaysia (Mohamud et al., 2011). Economic and technological advancements in the past decades have led to changes in the lifestyle including eating habits. The nutrition transition has shifted from the traditional diet to Western-style diets such as high amounts of fat and calorie intake. This phenomenon has led to an obesity epidemic in Malaysia (Kuan et al., 2011). The prevalence of overweight and obesity among adult were 33.6% and 19.5% respectively and the prevalence of obesity was higher in females than males (Mohamud et al., 2011). Being overweight or obese is accountable for the increased risk of adult morbidity and mortality.

In a society where a significant proportion of adults are overweight or obese, it is not surprising that body image dissatisfaction and body weight concerns are common. The previous study indicated that the prevalence of body image dissatisfaction in developed countries ranges from 35% to 81% among females and from 16% to 55% among males (Lawler & Nixon, 2011). Previous studies revealed that males and females differed in their perception of body image (Brennan et al., 2010; Shaheen et al., 2016). In addition, females are often reported to be more concerned and dissatisfied with their body image as compared to males (Kuan et al., 2011). Females wish to be thin and slender while males are keen to achieve an ideal body figure of masculinity (Kuan et al., 2011).

Body image plays an important role in the management of body weight. The body mass index (BMI) is the most common method of describing body weight in relation to height and is often used to derive a healthy weight. Body image satisfaction decreases with increasing BMI (Zaccagni et al., 2014). The study reported that an overweight person was less satisfied with their body as compared to a normal weight person of both genders (Zaccagni et al., 2014). Adults who considered themselves fat tended to engage in practices for weight loss. However, being overweight or obese could be misperceived as normal weight

(Kuan et al., 2011). Since real body shape is sometimes misperceived, a correct self-perception of body image in relation to body weight status is important in order to understand its relationship and in planning for the weight control program.

The body image concern has become a major issue among young adults due to the adverse effects which can lead to depression, poor nutritional status and the development of eating disorders (Ackard et al., 2002). Individuals who have body image dissatisfaction are more likely to adopt behaviours that may place them in overall poor health. The adoption of the dieting method rather than eating healthier food is common among those with body image dissatisfaction (Pang & Razalee, 2012). Some common eating habits of university students include dieting, meal skipping, unhealthy snacking, and frequent fast-food consumption (Gan et al., 2011). Such eating habits in the long term is associated with an eating disorder.

Eating disorders generally relate to abnormal or disturbed eating patterns and poor eating habits such as binge-eating, restricted calorie intake, and skipping meals or snacking (Manaf et al., 2016). Past studies had shown that body image dissatisfaction increased the risk of an eating disorder (Boutelle et al., 2002; Soo et al., 2008). Gan et al. (2011) found that Malaysian female students (21.3%) had a significantly higher risk of developing an eating disorder than male students (13.5%). Those who wish to be thinner avoid the consumption of several foods to prevent being overweight, and they are less likely to consume breakfast cereals, pasta and rice dishes, high-fat foods, soft drinks, and chocolates (Bibiloni et al., 2013). It was also reported that those who had body image dissatisfaction was likely to have a decreased consumption of high-fat food, but they also did not increase the consumption of fruits and vegetables, which reflected a diet restriction rather than eating healthier food as a method to lose weight (Alipour et al., 2015). Therefore, it is necessary to assess the relationship between body image dissatisfaction and the dietary intake among university students.

Currently, body image has been the focus of many studies in overseas countries such as Japan and Korea by Han (2003), Sakamaki et al. (2005a), and Woo (2014). However, there is a lack of data in Malaysia focuses on the association between body image perceptions and dietary patterns among university students. Therefore, these data are needed in order to design a nutrition and weight interventions to improve body weight status and the dietary intake among university students. Given the critical role of body image in shaping the students' body weight and dietary intake, hence, this study aims to determine the gender differences in body image perception and its association with body mass index and dietary intake among university students.

METHOD

Design and Sampling

A cross-sectional study was carried out by using a convenience sampling method. Inclusion criteria include Malaysians

undergraduate students' age between 18-24 in the University of Nottingham Malaysia (UNM) while the exclusion criteria were students known to be suffering from chronic diseases and who were pregnant. The sample size was determined from a population size which approximately 140 students by using Cochran's formula (Singh & Masuku, 2014). To determine proportions in the population, Z value for a 95% confidence level is 1.96 with a p-value of 0.5; an acceptable sampling error was assumed as 0.05 (Singh & Masuku, 2014). Hard copies of the questionnaires were printed out and distributed to the students. Among the 140 questionnaires which were given out, only 100 participants completed this study and the overall response rate was 71.4%. All the respondents signed the informed consent forms before participating in this study. Ethics approval was obtained by the Science and Engineering Research Ethics Committee of the University.

Data Collection

The height (m) of participants was measured with SECA 217 stadiometer while weight (kg) were obtained from Bioelectrical Impedance Analysis (Tanita DC-430 MA) with shoes removed and adjusted to the nearest of 0.5kg clothes weight. Body Mass Index (BMI), kg/m^2 was derived from height and weight. The body weight classification of participants was categorised into underweight (< 18.5 kg/m^2), normal weight (18.5-22.9 kg/m^2), overweight (23.0-24.9 kg/m^2), pre-obese (25-29.9 kg/m^2) and obese (≥ 30.0 kg/m^2) by using Asian criteria cut-offs from World Health Organization (2004).

The questionnaires comprised Section A, B, C, and D. Section A was sociodemographic information of participants included name, age, gender, ethnicity, physical activity levels, and living arrangements. On the other hand, the nutritional assessment of participants was obtained from anthropometric measurements.

Section B assessed the body image perceptions through Body Shape Questionnaire (BSQ) which was developed by Cooper et al. (1987). It was well-validated with a high internal consistency of α = 0.93-0.97 (Cooper et al., 1987). BSQ was a self-reported questionnaire consists of 34-items with six-point Likert scales varying from 1 to 6 (always = 6; very often = 5; often = 4; sometimes = 3; rarely = 2 and never = 1). It was an instrument to measure body image concern, self-discrepancy because of physical appearance, and the fear of being fat. The result was the summation of 34-items points whereby the total scores <80 was considered as normal, 80-110 was considered as the mild level of body concern, range from 111-140 was categorised as moderate and >140 was classified as severe body image distortion.

Section C was the Figure Rating Scale developed by Stunkard et al. (1983) to assess the body image perception through self-rating body silhouette. However, the Asian version of the silhouette revised by Nagasaka et al. (2008) was used in this study. The scale from very underweight

(left) to very overweight (right) (score 1-9) as shown in Figures 1 and 2. Participants were being asked to choose their perception of current body size and their ideal body size perception according to the silhouette with scale rated. Then, the discrepancy of scores was calculated by the difference between ideal body size and perceived current body size. A positive score indicated the desire to be fatter; zero scores reflected body satisfaction while a negative score indicated a desire to be thinner.

Section D was the assessment of dietary intake through meal practices such as meal skipping and snacking habits adopted by Bibiloni et al. (2013). In addition, three-day 24-hours dietary recalls (2 weekdays and 1 weekend day) to examine the participants' energy and nutrients intake. The mean of daily intakes included energy, the percentage of energy intakes, macronutrients, and micronutrients were derived from dietary data analysis computing software named Nutritics. The nutrient intakes were compared to Malaysian RNI (National Coordinating Committee on Food and Nutrition [NCCFN], 2017). Semi-Quantitative Food Frequency Questionnaire (SFFQ) which was adapted from El Ansari et al. (2010) was used to measure the consumption of cereal products, sweets (sugar-sweetened beverages), cakes/cookies, junk food, meat, fish, eggs, dairy products, fruits, and vegetables. It was a five-point scale rated from several times a day (1 point), daily (2 points), several times a week (3 points), 1-4 times a month (4 points), and never (5 points). Then, the points for sweets, cakes/cookies, and junk food were sum up as "Unhealthy diet score". The other food groups were sum up as "Healthy diet score" in a reversed point scale such as several times a day (5 points) and followed the sequence. The sum of nutrition scores was categorised into three tertiles as low (1st tertile), medium (2nd tertile = median), and high (3rd tertile) (El Ansari et al., 2010).

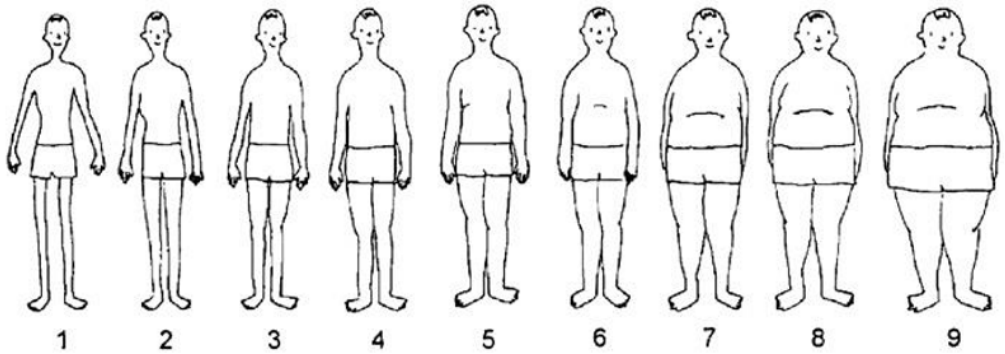


Figure 1. Body image figures of males from underweight to obese size (scale 1-9) which have been modified by Nagasaka et al. (2008)

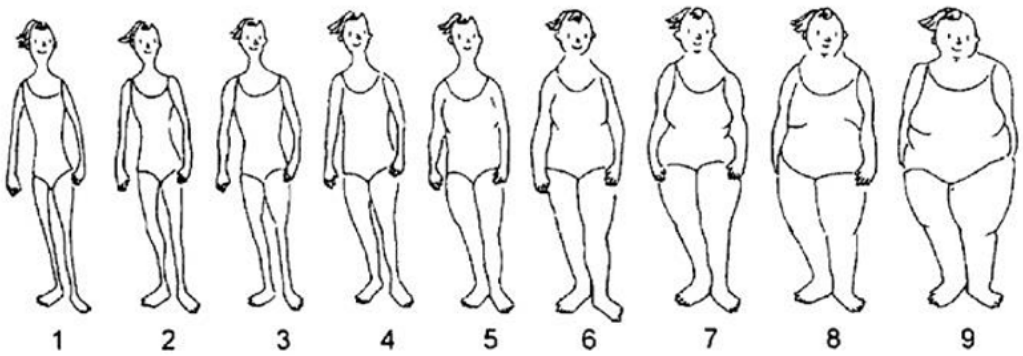


Figure 2. Body image figures of female from underweight to obese size (scale 1-9) which have been modified by Nagasaka et al. (2008).

Statistical Analysis

The data were analysed using IBM Statistical Program Package for Social Sciences (SPSS) software version 24.0. The categorical data were summarized using descriptive statistics as number and percentage while continuous data were presented as mean and standard deviations. The associations between categorical variables were carried out by Chi-Square tests and independent sample t-test to observe the statistical differences. Pearson correlation test was used to determine the association between body image and BMI. The statistical significance was set at $p<0.05$; CI 95%.

RESULTS

Demographic Data

Table 1 shows the characteristics of the participants by gender. A total of 100 participants were recruited in this study which comprised 50% males and 50% females. The mean age of the participants was 20.9±1.1 years old. Majority of the participants were Chinese (83%) followed by Malay (12%), Indian (3%), and other ethnicities such as Indian Malay (2%). Majority of the participants (61%) were lived outside of campus. Most of the students (47%) engaged with light physical activity levels. However, there was no significant difference in age group, ethnicity, living arrangements, and physical activity level between males and females ($p > 0.05$).

On the other hand, male was statistically taller and heavier than female. The mean height of male was 1.71±0.05 m while female was 1.57±0.06 m. The mean weight of male was 64.64±8.35 kg while female was 53.87±10.99 kg. However, there was no significant difference in BMI between male (22.16 ± 2.69 kg/m^2) and female (21.73 ± 3.95 kg/m^2). Majority of male (64%) and female (64%) were in the normal weight category. Pre-obesity or overweight is higher in male students than females. Meanwhile, more females were underweight (14%) than males (6%). No significant

difference was found between genders in body weight status ($p>0.05$).

Table 1 also shows the gender differences between body shape concerns based on the BSQ score. There was a significant difference in BSQ scores in females (94.20±24.81) than males (65.30±20.56). Majority of the females (44%) had a mild concern on their body image whereas majority of males (78%) had normal body shape concerns. Meanwhile, 54% of males perceived themselves in the normal category whereas 48% of females perceived themselves as fat. There was no significant difference in body image perception between males and females ($p>0.05$). There was a marginally significant difference in body shape dissatisfaction among gender ($p>0.05$). About 80% of female participants wished to be thinner as compared to 58% of male participants. Conversely, about 28% of males wished to be fatter as compared to 12% of female students.

Table 1

Characteristics of the study participants according to gender (n=100)

Variables	**Total N = 100 N (%)**	**Male N = 50 N (%)**	**Female N = 50 N (%)**	**P-value**
Age group (years)	20.86 ± 1.08	20.72 ± 1.11	21.00 ± 1.05	0.197[a]
18-19 years	16 (16)	9 (18)	7 (14)	
20-21 years	60 (60)	30 (60)	30 (60)	0.812[b]
22-23 years	24 (24)	11 (22)	13 (26)	
Ethnicity				
Malay	12 (12)	5 (10)	7 (14)	
Chinese	83 (83)	42 (84)	41 (82)	0.148[b]
Indian	3 (3)	3 (6)	0	
Others	2 (2)	0	2 (4)	
Living arrangements				
On campus	39 (39)	17 (34)	22 (44)	0.305[b]
Off campus	61 (61)	33 (66)	28 (56)	
Physical activity level				
Very active	4 (4)	3 (6)	1 (2)	
Moderate	43 (43)	24 (48)	19 (38)	0.453[b]
Light	47 (47)	20 (40)	27 (54)	
None	6 (6)	3 (6)	3 (6)	
Height (m)	1.64 ± 0.09	1.71 ± 0.05	1.57 ± 0.06	<0.001[a]**
Weight (kg)	59.26 ± 11.12	64.64 ± 8.35	53.87 ± 10.99	<0.001[a]**

Table 1 *(Continued)*

Variables	Total N = 100 N (%)	Male N = 50 N (%)	Female N = 50 N (%)	P-value
BMI (kg/m²)	21.95 ± 3.37	22.16 ± 2.69	21.73 ± 3.95	0.522[a]
Underweight (< 18.5 kg/m²)	10 (10)	3 (6)	7 (14)	
Normal weight (18.5-22.9 kg/m²)	64 (64)	32 (64)	32 (64)	0.529[b]
Overweight (23.0-24.9 kg/m²)	7 (7)	4 (8)	3 (6)	
Pre-obese (25-29.9 kg/m²)	19 (19)	11 (22)	8 (16)	
BSQ score	79.75 ± 26.92	65.30 ± 20.56	94.20 ± 24.81	<0.001[a]**
Normal (< 80)	54 (54)	39 (78)	15 (30)	
Mild concern (80-110)	31 (31)	9 (18)	22 (44)	<0.001[b]**
Moderate concern (111-140)	15 (15)	2 (4)	13 (26)	
Body Image Perception				
Thin	6 (6)	3 (6)	3 (6)	
Normal	50 (50)	27 (54)	23 (46)	0.710[b]
Fat	44 (44)	20 (10)	24 (48)	
Body Image Dissatisfaction				
Desired to be thinner	69 (69)	29 (58)	40 (80)	
Satisfied with current body size	11 (11)	7 (14)	4 (16)	0.056[c]
Desired to be fatter	20 (20)	14 (28)	6 (12)	

Note:
BMI = Body Mass Index; BSQ = Body Shape Questionnaire
[a] Independent t-test shows no significant difference p>0.05; a significant difference ** p<0.01, data is presented as mean and standard deviation (SD).
[b] Chi-Square test shows no significant difference p>0.05; a significant difference ** p<0.01.
[c] Chi-Square test was used, data shows marginally significant p>0.05.

Associations between Body Image and Body Mass Index

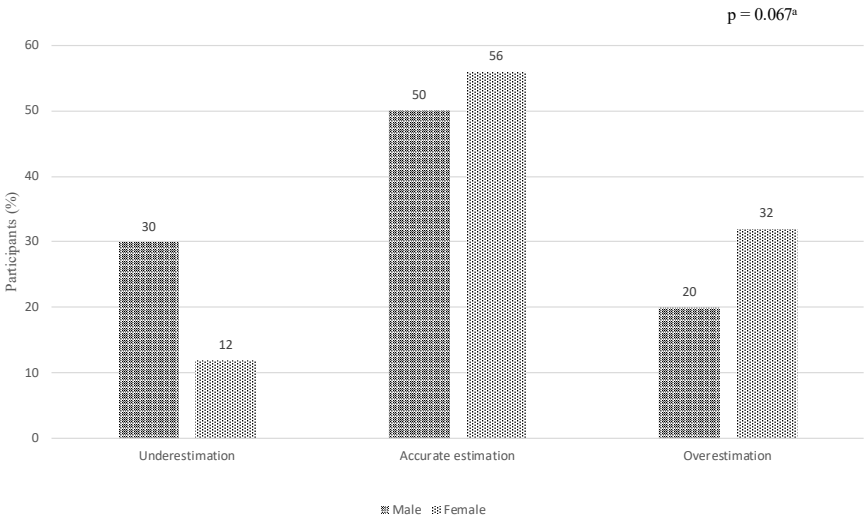
Table 2 shows the perceived body image based on Figure Rating Scale and BMI according to gender. Majority of males (44%) in normal weight perceived themselves accurately in the Figure Rating Scale. Besides, 20% of males in pre-obese underestimated their body shape followed by 14% of males overestimated their body shape as overweight. Meanwhile, majority of females (40%) in normal weight also perceived themselves correctly whereas 24% misperceived themselves as overweight although they have normal body weight. Around 12% of females who were pre-obese underestimated their body weight as overweight.

Figure 3 shows the proportions of males and females in body image perception estimation. More females (56%) made an accurate estimation of their body shape than males (50%). About 32% of females overestimated their body weight than 20% of males. On the other hand, 30% of males underestimated their body shape as compared to 12% of females. However, there was no significant difference in the estimation of body image perception among gender ($p>0.05$).

Table 2

The perceived body image and body weight status by gender

Body Weight Status	Body Image Perception			
	Underweight (Fig. 1, 2) N (%)	**Normal (Fig. 3, 4) N (%)**	**Overweight (Fig. 5, 6, 7) N (%)**	**Obese (Fig. 8, 9) N (%)**
Male (N = 50)				
Under	0	3 (6)	0	0
Normal	3 (6)	22 (44)	7 (14)	0
Over	0	1 (2)	3 (6)	0
Pre-obese	0	1 (2)	10 (20)	0
Female (N = 50)				
Under	3 (6)	3 (6)	1 (2)	0
Normal	0	20 (40)	12 (24)	0
Over	0	0	3 (6)	0
Pre-obese	0	0	6 (12)	2 (4)
Total (N = 100)				
Under	3 (3)	6 (6)	1 (1)	0
Normal	3 (3)	42 (42)	19 (19)	0
Over	0	1 (1)	6 (6)	0
Pre-obese	0	1 (1)	16 (16)	2 (2)



Note: [a] Chi-Square test was used, data shows no significant difference ($p>0.05$)

Figure 3. The comparison of estimation body image perception between male and female students

The dissatisfaction group (desired to be thinner or fatter) and satisfaction group (satisfied with current body size) were categorised based on the discrepancy of scores from the Figure Rating Scale. There was a significant difference in body shape concern between body image satisfied group and dissatisfied group (Table 3). Participants who were dissatisfied with their body image had a higher body shape concern (mean score of 82.24 ± 27.17) than the body image satisfied group (mean score of 59.64 ± 13.28). Ninety-one percent (91%) of the participants in the body image satisfied group had normal concern on their body shape, whereas 51% of participants in the dissatisfied group had mild to moderate concern on the body image.

Table 3 also shows the BMI between perceived body image satisfied and dissatisfied group. There was a significant difference in the mean BMI between body image dissatisfied and satisfied group. The mean body mass index in the body image dissatisfied group (22.07±3.53 kg/m^2) was significantly higher than the satisfied group (20.97±1.27 kg/m^2). This showed that participants with high mean body mass index were dissatisfied with their body image. However, there was no significant difference in the body weight category between both groups. In the body image dissatisfied group, most participants were in the normal weight category (60%) followed by the pre-obese category (21%).

Figure 4 shows the correlation between body shape concern score and BMI. There was a weak positive correlation ($p<0.01$) between BSQ scores and BMI, which was statistically significant ($r=0.306$, $p=0.002$). This signified an increase in body mass index increased the body shape concern scores. In other words, participants with a high body mass index had higher body shape concerns towards themselves.

Table 3

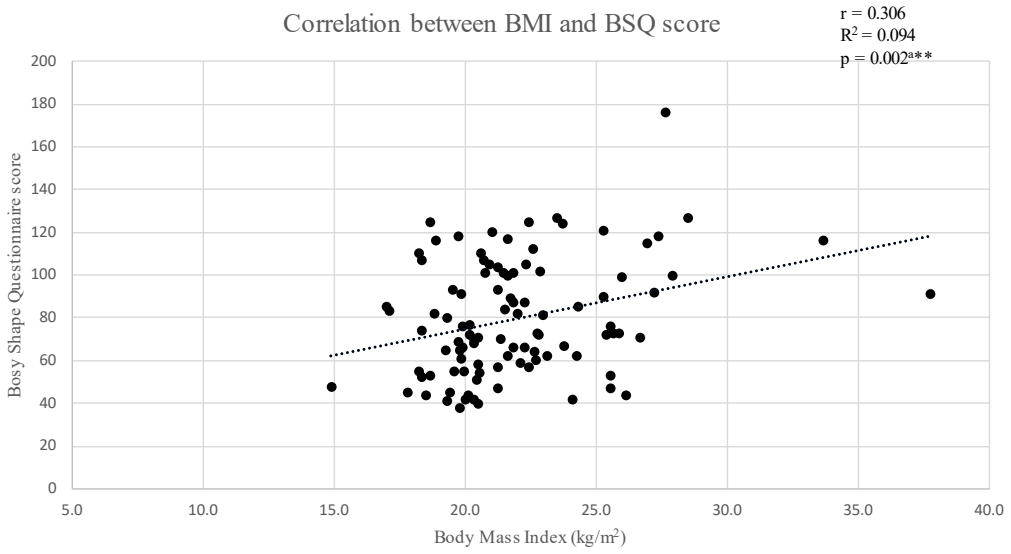
Body shape concern and body mass index between body image satisfied and dissatisfied group

Perceived Body Image Satisfaction	**Satisfied N = 11 N (%)**	**Dissatisfied N = 89 N (%)**	**P-value**
Body Shape Concern	59.64 ± 13.28	82.24 ± 27.17	0.008[a]**
Normal concern	10 (91)	44 (49)	0.009[b]**
Mild to Moderate concern	1 (9)	45 (51)	
Body Mass Index kg/m²	20.97 ± 1.27	22.07 ± 3.53	0.049[a]*
Body Weight Status			
Underweight (< 18.5 kg/m²)	0	10 (11)	0.073[b]
Normal weight (18.5-22.9 kg/m²)	11 (100)	53 (60)	
Overweight (23.0-24.9 kg/m²)	0	7 (8)	
Pre-obese (25-29.9 kg/m²)	0	19 (21)	

Note:

[a] Independent t-test was used, data shows significant difference * p<0.05; ** p<0.01, data is presented as mean and standard deviation.

[b] Chi-Square test was used, data shows no significant difference p>0.05; a significant difference ** p<0.01.



Note: [a] Pearson Correlation test was used with significance difference ** p<0.01

Figure 4. Scatter diagram showing a positive relationship between BSQ and BMI

Associations between Body Image and Dietary Intake

Table 4 shows the meal practices between body image satisfied and dissatisfied group according to gender. There was no significant difference between the satisfied group and the dissatisfied group in males for meal practices. On the other hand, there was a significant difference in snacking between satisfied and dissatisfied groups among females ($p<0.05$). Sixty-five percent (65%) of females who had body image dissatisfaction seldom snack whereas 75% of females who had satisfied body image always snack in between meals.

Table 5 describes the differences between body image satisfied and dissatisfied group in nutrition score according to gender. The nutrition score in this study was obtained based on the assessment of the Semi-Quantitative Food Frequency Questionnaire (SFFQ) (El Ansari et al., 2010). There was no significant difference between satisfied and dissatisfied with body image

Table 4

Meal practices by perceived body image satisfaction among male and female undergraduate students

Meal Practices	Male (N = 50)		P-value[a]	Female (N = 50)		P-value[a]
	Satisfied N = 7 N (%)	Dissatisfied N = 43 N (%)		Satisfied N = 4 N (%)	Dissatisfied N = 46 N (%)	
Regular mealtime						
Always	4 (57)	22 (51)	0.895	2 (50)	17 (37)	0.769
Seldom	3 (43)	20 (47)		2 (50)	25 (54)	
Never	0	1 (2)		0	4 (9)	
Skipping meals						
Always	2 (29)	6 (14)	0.617	0	8 (17)	0.648
Seldom	3 (42)	23 (53)		3 (75)	30 (66)	
Never	2 (29)	14 (33)		1 (25)	8 (17)	
Snacking between meals						
Always	2 (29)	12 (28)	0.977	3 (75)	16 (35)	<0.001*
Seldom	4 (57)	26 (60)		0	30 (65)	
Never	1 (14)	5 (12)		1 (25)	0	
Supper						
Always	2 (29)	9 (21)	0.752	0	11 (24)	0.123
Seldom	3 (42)	25 (58)		2 (50)	29 (63)	
Never	2 (29)	9 (21)		2 (50)	6 (13)	

Note: [a] Chi-Square test was used and showed significance difference * $p<0.05$

Table 5

Nutrition score based on food group consumption by perceived body image satisfaction among male and female undergraduate students

Nutrition score	Male (N = 50)		P-value[a]	Female (N = 50)		P-value[a]
	Satisfied N = 7 N (%)	Dissatisfied N = 43 N (%)		Satisfied N = 4 N (%)	Dissatisfied N = 46 N (%)	
Unhealthy diet score*						
Low (1st tertile)	2 (29)	9 (21)		0	7 (15)	
Medium (2nd tertile)	3 (42)	29 (67)	0.375	3 (75)	29 (63)	0.702
High (3rd tertile)	2 (29)	5 (12)		1 (25)	10 (22)	
Healthy diet score*						
Low (1st tertile)	1 (14)	11 (26)		0	7 (15)	
Medium (2nd tertile)	5 (72)	21 (48)	0.540	3 (75)	28 (61)	0.695
High (3rd tertile)	1 (14)	11 (26)		1 (25)	11 (24)	

Note: [a] Chi-Square test showed no significant difference ($p>0.05$)

*Unhealthy diet was comprised of sweets/sugar beverages, cakes, and snacks while a healthy diet was comprised of carbohydrate (cereals), protein (meat, fish, dairy, eggs) and fibres (fruits and vegetables) food groups.

for both genders (p>0.05). Majority of the participants from both satisfied and dissatisfied groups fall in the medium score for health and unhealthy diet score.

Table 6 summarises the energy and macronutrient intakes between male and female students. There was a significant difference between male and female students in the mean intake of energy and macronutrients such as protein and fat (p<0.05). Male students had higher mean intakes of energy and macronutrients than female students. However, majority of the participants failed to meet the RNI for all nutrients. Table 7 summarises the micronutrient intakes between male and female students. Male students had significantly higher mean intakes of sodium, potassium, and magnesium than female students (p<0.05). Majority of them failed to meet the RNI recommendation for micronutrients.

Table 6

Energy and macronutrient intakes between male and female undergraduate students

Macronutrients			**Male** **N = 50** **Mean ± SD**	**RNI[a]**
Energy intake	(kcal/day)		1839 ± 615	2240
		<RNI	41 (82)[c]	
		>RNI	9 (18)	
Protein	(g/day)		94.7 ± 38.4	62
	(% energy)		20.6 ± 4.1	
		<RNI	8 (16)	
		Meet RNI	1 (2)	
		>RNI	41 (82)	
Fat	(g/day)		68.8 ± 25.9	62-75
	(% energy)		33.5 ± 5.5	
		<RNI	25 (50)	
		Meet RNI	8 (16)	
		>RNI	17 (34)	
Fibre	(g/day)		12.0 ± 5.3	20-30
		<RNI	45 (90)	
		>RNI	5 (10)	
Saturated fat	(g/day)		18.7 ± 8.5	
Monounsatura-ted fat	(g/day)		18.7 ± 8.8	
Polyunsaturat-ed fat	(g/day)		9.1 ± 3.8	
Cholesterol	(mg/day)		312 ± 156	<300
		Meet RNI	24 (48)	
		>RNI	26 (52)	

Table 6 *(Continued)*

Macronutrients		**Female** **N = 50** **Mean ± SD**	**RNI[a]**	**P-value[b]**
Energy intake	(kcal/day)	1436 ± 384 45 (90) 5 (10)	1840	<0.001*
Protein	(g/day) (% energy)	64.6 ± 26.1 17.8 ± 4.0 18 (36) 0 32 (64)	53	<0.001* 0.001*
Fat	(g/day) (% energy)	56.5 ± 18.9 35.0 ± 4.8 20 (40) 11 (22) 19 (38)	51-61	0.008* 0.174
Fibre	(g/day)	10.1 ± 4.8 46 (92) 4 (8)	20-30	0.068
Saturated fat	(g/day)	16.3 ± 7.6		0.128
Monounsaturated fat	(g/day)	15.6 ± 6.9		0.048*
Polyunsaturated fat	(g/day)	7.2 ± 3.2		0.007*
Cholesterol	(mg/day)	230 ± 152 35 (70) 15 (30)	<300	0.010*

Note:
[a] RNI = Recommended Nutrient Intake based on NCCFN (2017)
[b] Independent t-test was used which presented as mean and standard deviation
[c] Values in brackets presented as percentage
*Significance difference ($p<0.05$)

Table 7

Micronutrient intakes between male and female undergraduate students

Micronutrients			**Male N = 50 Mean ± SD**	**RNI[a]**
Sodium	(mg/day)		3123 ± 1154	1500
		<RNI	2 (4)[c]	
		>RNI	48 (96)	
Potassium	(mg/day)		1547 ± 540	4.7
		<RNI	50 (100)	
Calcium	(mg/day)		464 ± 223	1000
		<RNI	47 (94)	
		>RNI	3 (6)	
Magnesium	(mg/day)		156 ± 67	400
		<RNI	50 (100)	
		>RNI	0	
Iron	(mg/day)		11.2 ± 4.7	9
		<RNI	17 (34)	
		Meet RNI	2 (4)	
		>RNI	31 (62)	
Vitamin D	(µg/day)		2.20 ± 2.07	15
		<RNI	50 (100)	
		>RNI	0	
Vitamin C	(mg/day)		49.7 ± 40.5	70
		<RNI	39 (38)	
		Meet RNI	1 (2)	
		>RNI	10 (20)	

Micronutrients		**Female N = 50 Mean ± SD**	**RNI[a]**	**P-value[b]**
Sodium	(mg/day)	2446 ± 880	1500	0.001*
		9 (18)		
		41 (82)		
Potassium	(mg/day)	1196 ± 491	4.7	0.001*
		50 (100)		
Calcium	(mg/day)	400 ± 165	1000	0.106
		50 (100)		
		0		

Table 7 *(Continued)*

Micronutrients		**Female** **N = 50** **Mean ± SD**	**RNI[a]**	**P-value[b]**
Magnesium	(mg/day)	113 ± 62 49 (98) 1 (2)	310	0.001*
Iron	(mg/day)	10.4 ± 5.4 47 (94) 0 3 (6)	20	0.401
Vitamin D	(µg/day)	1.98 ± 2.61 49 (98) 1 (2)	15	0.651
Vitamin C	(mg/day)	39.0 ± 46.4 46 (92) 0 4 (8)	70	0.222

Table 8 summarises the energy and nutrient intakes of participants according to perceived body image satisfaction. The mean energy intake of the dissatisfied group (1628±533 kcal/day) was lower than the satisfied group (1708±690 kcal/day). However, there was no significant difference in energy and nutrient intakes between satisfied and dissatisfied groups ($p>0.05$). Majority of them had failed to meet the RNI for all nutrients irrespective of body image dissatisfaction. There was a significant difference ($p<0.05$) in the dissatisfied group where their % energy derived from fat (34.5±5.4%) had a higher mean percentage than the satisfied group (32.1±2.6%). Table 9 summarises the micronutrient intakes of participants according to perceived body image satisfaction. There was no significant difference in micronutrient intakes between satisfied and dissatisfied groups ($p>0.05$). Majority of them failed to meet the RNI irrespective of body image dissatisfaction.

DISCUSSIONS

This study aims to determine the gender differences in body image perception and its association with body mass index and dietary intake among university students.

Body Weight Status

In this study, the prevalence of overweight and pre-obese were higher in male students than females while females had a higher prevalence of being underweight. These findings were consistent with two Malaysian

Table 8

Energy and macronutrient intakes by perceived body image satisfaction among undergraduate students

Macronutrients			**Satisfied N = 11 Mean ± SD**	**Dissatisfied N = 89 Mean ± SD**	**P-value[b]**
Energy intake	(kcal/day)		1708 ± 690	1628 ± 533	0.651
		<RNI[a]	10 (91)[c]	76 (85)	
		>RNI	1 (9)	13 (15)	
Protein	(g/day)		84.9 ± 47.4	79.0 ± 34.6	0.611
	(% energy)		18.9 ± 4.2	19.2 ± 4.3	0.826
		<RNI	3 (27)	23 (26)	
		Meet RNI	0	1 (11)	
		>RNI	8 (73)	65 (73)	
Fat	(g/day)		61.1 ± 25.3	62.8 ± 23.2	0.821
	(% energy)		32.1 ± 2.6	34.5 ± 5.4	0.018*
		<RNI	6 (55)	39 (44)	
		Meet RNI	3 (27)	16 (18)	
		>RNI	2 (18)	34 (38)	
Fibre	(g/day)		11.9 ± 5.0	10.9 ± 5.2	0.572
		<RNI	10 (91)	81 (91)	
		>RNI	1 (9)	8 (9)	
Saturated fat	(g/day)		15.9 ± 8.1	17.7 ± 8.2	0.480
Monounsaturated fat	(g/day)		15.5 ± 9.0	17.3 ± 7.9	0.485
Polyunsaturated fat	(g/day)		7.3 ± 3.6	8.3 ± 3.6	0.413
Cholesterol	(mg/day)		285 ± 200	269 ± 154	0.760
		<RNI	5 (45)	54 (61)	
		>RNI	6 (55)	35 (39)	

Note:

[a] RNI = Recommended Nutrient Intake based on NCCFN (2017)

[b] Independent t-test was used which presented as mean and standard deviation

[c] Values in brackets presented as percentage

*Significance difference ($p<0.05$)

Table 9

Micronutrient intakes by perceived body image satisfaction among undergraduate students

Micronutrients			**Satisfied (N = 11) Mean ± SD**	**Dissatisfied (N = 89) Mean ± SD**	**P-value[b]**
Sodium	(mg/day)		3128 ± 1555	2742 ± 1006	0.439
		<RNI[a]	2 (18)[c]	9 (10)	
		>RNI	9 (82)	80 (90)	
Potassium	(mg/day)		1357 ± 494	1373 ± 551	0.926
		<RNI	11 (100)	89 (100)	
Calcium	(mg/day)		486 ± 236	425 ± 193	0.336
		<RNI	10 (91)	87 (98)	
		>RNI	1 (9)	2 (2)	
Magnesium	(mg/day)		140 ± 52	134 ± 69	0.756
		<RNI	11 (100)	88 (99)	
		>RNI	0	1 (1)	
Iron	(mg/day)		10.8 ± 5.2	10.8 ± 5.0	0.975
		<RNI	6 (55)	58 (65)	
		Meet RNI	0	2 (2)	
		>RNI	5 (45)	29 (33)	
Vitamin D	(µg/day)		1.79 ± 1.13	2.13 ± 2.46	0.650
		<RNI	11 (100)	88 (99)	
		>RNI	0	1 (1)	
Vitamin C	(mg/day)		45.4 ± 37.3	44.3 ± 44.5	0.935
		<RNI	9 (92)	76 (85)	
		Meet RNI	0	1 (1)	
		>RNI	2 (18)	12 (14)	

Note:

[a] RNI = Recommended Nutrient Intake based on NCCFN Malaysia (2017).

[b] Independent t-test was used which presented as mean and standard deviation

[c] Values in brackets presented as percentage

studies by Kuan et al. (2011) and Pang and Razalee (2012) who reported that male university students had a higher prevalence of overweight and pre-obese than females whereas the prevalence of underweight was higher among female students as compared to males. A higher prevalence of underweight among female students might be due to the desire for skinny body shape (Sakamaki et al., 2005b). On the contrary, lifestyle habits such as physical inactivity can be a contributor to raising the risks of being obesity among students (Mahgoub et al., 2016). Our findings showed that majority of the students were less physically active, and males were more active than females. These findings were similar to the study by Rajappan et al. (2015) who reported that high prevalence of physical inactivity found among females and those who were obese.

Body Image and Its Association with Body Mass Index

Comparison between genders in terms of body image dissatisfaction revealed that majority of females desired to be thinner whereas males desired to have a larger body size. Our findings are in line with the findings reported by Wong and Say (2013). The possible explanation could be deduced from men and women defined body image differently. When compared at gender level, attractiveness is associated with being thin for women, whereas a more muscular appearance is considered attractive for men (Moustafa et al., 2017). This was proven through various studies looking at the gender differences in body image (Kamaria et al., 2016; Moustafa et al., 2017; Shaheen et al., 2016; Yin & Seng, 2010). Previous studies reported that female students were less satisfied with their body shape than males (Kamaria et al., 2016; Yin & Seng, 2010). Shaheen et al. (2016) reported that males desired the area-specific body parts such as chest and shoulders to be larger. Moustafa et al. (2017) revealed that body dissatisfaction among males was usually related to a lack of muscle mass and not the fat mass. In our study, females expressed a higher level of body image dissatisfaction than males. Body image dissatisfaction among females may be due to the influence of social media which portrayed the ideal image for females as thinner and skinny (Moustafa et al., 2017). Prolonged exposure to the desirable ideal body image subsequently results in body shape dissatisfaction among young adults, especially females (Cheung et al., 2011).

Our findings showed that there was a significant positive correlation between BMI and body shape concern. This indicated students with higher BMI expressed higher body shape concerns. Similar findings were reported by Gillen and Lefkowitz (2012). They found that BMI was associated with body dissatisfaction whereby the increase of BMI led to greater dissatisfaction with body image in both genders (Gillen & Lefkowitz, 2012). This happens due to university students leaving home for university and having increased exposure to the different environment and surrounding people. In addition, university students are also more concerned about social figures, celebrities, and fashion models and may follow them to

achieve body perfectionism (Wong & Say, 2013). Overweight students are concerned with their body shape as they hope to have a nice appearance (Wong & Say, 2013). Peer pressures drive the university students to become highly concerned to maintain an attractive unrealistic body image in order to gain popularity among peers (Tsang, 2017).

On the other hand, our study found out that more females overestimated their body weight although they had normal body weight. This finding was similar to the study reported that females were more likely to perceive themselves as fat than males (Zaccagni et al., 2014). Conversely, more males in this study underestimated their body weight than females. This observable trend was similar in the study reported that females tend to overestimate their body weight while males tend to underestimate their body weight (Kuan et al., 2011). In fact, body image dissatisfaction leads to a misperception of their own body weight (Shagar et al., 2014). This could be due to the influence of mesomorphic body shape causing males to admire a V-shaped figure, with a more muscular upper body, and the desire to be heavier in weight (Rathakrishnan & Chuen, 2011). On the other hand, females are often exposed to the belief that thin figures are ideal for females, therefore more females preferred thin as their ideal body image (Swami & Way, 2006).

Body Image and Its Relationship with Dietary Intake

An increasing trend of unhealthy dietary habits is predominantly found among university students (Gan et al., 2011). This could be related to the sociocultural pressure that leads the students to pursue an unattainable body shape which consequences in eating disturbances (Balluck et al., 2016). There was a significant difference in snacking between satisfied and dissatisfied groups among females. Our study found out that 65% of females who had body image dissatisfaction seldom snack whereas 75% of females who had satisfied body image always snack in between meals. However, there was no significant difference in meal practices and body image dissatisfaction among male students. This could be due to females with dissatisfied body image always think that they are not thin enough and therefore they try to lose weight by seldom snacking in-between meals. A study by Wong and Say (2013) stated that overweight students with body shape concerns were prone to have a healthy lifestyle while underweight students with body shape concerns were focused to achieve a good physical appearance. A study reported by Shagar et al. (2014) stated that misperception of own body weight was associated with unhealthy dietary eating patterns such as different kinds of dieting and meal skipping practices. Cheung et al. (2011) also observed that misperception of weight status and body image dissatisfaction especially the desire to achieve an ideal body shape may practice unhealthy weight gain or loss.

When comparing the body image satisfaction and nutrition score based on the food group, no significant difference

in the nutrition score were found. Majority of the participants from both satisfied and dissatisfied groups fall in the medium nutrition score. This could be due to there are other factors which influence the food selection of students (Kabir et al., 2018) including individual factors (food taste, past eating habits), societal factors (peer influence), psychosocial factors (stress), and environment factors (food prices, healthy food availability) and they were not assessed in this study. In addition, it should be noted that people with high relative weight usually underreported their food intake (Tur et al., 2005). Other studies also reported similar findings. Those who had a body image dissatisfaction try to avoid weight gain, but they also did not increase the consumption of fruits and vegetables, reflecting that they are not eating healthier food (Alipour et al., 2015). Moreover, El Ansari et al. (2010) showed that students who perceived themselves as too thin were associated with both healthy diet score and high-calorie diet score (unhealthy diet score) whereas none of the scores was associated with those students who perceived themselves as too fat. These reasons perhaps answer the insignificant difference in the nutrition score between body image satisfied and dissatisfied group for both genders.

There was a significant difference between gender and dietary intake. Males had a higher mean energy intake and mean nutrients intake than females. Gan et al. (2011) also found that mean energy intakes and other nutrients for males and females failed to meet the RNI as well as gender differences in energy and nutrient intakes. Conversely, body image dissatisfaction had no association with dietary intake despite the unhealthy eating habit practices that may lead to inadequate energy and nutrient intake. Our findings revealed that there was a significant difference in energy derived from fat between the satisfied and dissatisfied group. The dissatisfied group had a higher mean fat energy intake (%) than the satisfied group. This could be due to most of the students who were dissatisfied with their body shape consumed more dietary fat. Our finding corroborated with another study reported that body image dissatisfaction was associated with total energy intake with an increase of macronutrient intake (Jodhun et al., 2016). Despite body image dissatisfaction in dietary intakes, a lack of nutritional knowledge among students may be one of the barriers to healthy food choices which affects the eating patterns and nutritional intakes (Ganasegeran et al., 2012).

LIMITATIONS

There are a few limitations to this study. First, due to the nature of the cross-sectional study, we could not determine the causal relationship between body image dissatisfaction, BMI, and dietary intake. Second, as the dietary recall was self-administered, the accuracy of the responses would rely solely on the memory and the honesty of the respondents. Moreover, the study did not take into account other possible factors that affect body images such as peer influence, family support,

and mass media. Several other factors that are known to affect dietary intakes such as socioeconomic status, stress, environmental factors, and individual factors were also not assessed in this study.

CONCLUSION

The current study showed that the prevalence of body image dissatisfaction in this study was 89%. University students especially females were more concerned about their body shape and had a higher prevalence of body image dissatisfaction. Overweight and pre-obese students tend to have a body image dissatisfaction towards themselves. Although there was no association of body image dissatisfaction on dietary patterns and nutrient intakes, females who had body image dissatisfaction seldom snack in between meals. Majority of university students did not meet the RNI recommendation. In conclusion, intervention programmes among university students should focus on weight management and body image awareness to achieve healthy body weight and a positive body image. Nutrition education must be advocating among university students in healthy food choices and proper eating habits because a balanced and adequate nutrient intake is important in maintaining health later in life. Further studies are needed to explore the association of body image dissatisfaction and nutrient intakes with an equally distributed range of body weight status, sociocultural factors, and involving a larger number of sample sizes.

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