International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 7,
2020 ISSN: 1475-7192

Obesity, Psychological Health and Eating Behaviour Patterns of Sultan Idris Education University Students in Malaysia

Abdul Mujeeb Khan
Prof. Dr. Rahmatullah Khan Abdul Wahab Khan
Dr. Md. Azman Shahadan
Faculty of Education and Human Development, Sultan Idris Education University, Tanjung Malim, Malaysia

Abstract: *Obesity in Malaysia is increasing rapidly. World Health Organization survey-2010 ranked Malaysia as sixth in Asia with highest adult obesity rate. Obesity contributes in severe health problems, drastically reduces quality of life and causes psychosocial problems. College/university is a critical period regarding unhealthy changes in eating behaviours among students. This study investigated the association between eating behaviour and obesity. The study examined differences in the eating behaviour of normal, overweight and obese students and their Psychological health at University Pendidikan Sultan Idris-(UPSI). The purpose was to examine university student's eating behaviour as a contributing factor to obesity.* ***Methods:*** *Cross-Sectional study was conducted among 100 respondents based on convenient sampling. Information on respondent's demographic characteristics and Body Mass Index (weight & height) were obtained. General Health Questionnaire-28 was used to measure psychological aspects of eating behaviour with original English version. While Eating Inventory was used to measure three dimensions: disinhibition, hunger and cognitive restraint of eating behaviour among three groups obese, overweight and normal weight students. One-Way ANOVA was used to compare eating behaviour.* ***Results:*** *Data analysis showed that obese students and overweight students had different eating behaviour, $F(97,2)=2.87$, $p\leq05$. Overweight students had better control on eating behaviour as compared to obese students. There is tendency of significant difference between Obese students (MDis+Hung =11.71, S.D.=4.74) and overweight (MDis+Hung=8.68, S.D.=4.64) group for subscale Disinhibition+Hunger, $F(2,97)=2.89$, $p=0.06$. Conclusion: Obese students have no insight on eating-preferences (E.g. less calories, low fat food consumption) and less control on eating behaviour. They face more psychological issues compared to non-obese students.*

Keywords: *Eating Behaviour, Obesity, Comparative Study, University Students*.

I. INTRODUCTION

Obesity statistics in Malaysia are increasing rapidly. The World Health Organization (WHO) survey in 2010 ranked Malaysia as sixth in Asia with highest adult obesity rate. Available data suggests the prevalence of obesity and overweight in Malaysia over last couple of decades has matched that of some developed countries. The second National Health Morbidity Survey (NHMS) in 1996 (IPH 1999) reported a prevalence of 17% overweight and 4% obesity in adults, while in third NHMS which was conducted in 2006 (IPH 2008) revealed an increase of overweight and obesity to 29% and 14% respectively. In research by Wan Nazaimoon *et* al. (2011), finding revealed that prevalence of overweight was 33% and obesity 19.5% among Malaysian adults. The sample of study was comprised of 531 participants involved with age less than 30 years. The study further indicated that females (22.5%) were more highly obese compared to males (14.1%). For the race category, it was found that the Indians (24.6%) are profoundly obese, followed by the Malays (23.2%). The least obese were the Chinese (8.2%). In contrary to the findings of Wan Nazaimoon *et* al. (2011), Cheong *et* al. (2010) argued that Malaysian males are likely to

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

become more common with overweight. In his study 367 Malaysian adults participated that consisted of 60.8% males and 39.2% females, the findings proved that 31.9% of males are overweight while 26.5% are of females. However, regardless of the gender, 16.1% are obese. In addition to that, 39% of females are categorized of having central obesity and only 2% more than the males group.

According to Nelson *et* al. (2008), there are two vital health issues among young adults who face transition in university life, which are poor eating habits and obesity. Since majority of students by themselves choose the type of food they prefer to eat, most of them lack proper information and knowledge in choosing healthy food. Thus, this impacts on their eating styles and life Šataliæ, Bariæ & Keser, (2007). Besides, Gan *et* al. (2011), pointed out that because of costly healthy food and availability of access to fast food, students may display unhealthy eating behaviour. This may lead to stressful life as a student.

As reported by Overweight and Obesity Statistics (2012), according to National Institutes of Health, an energy imbalance causes overweight and obesity. Biologically, human bodies need certain amount of energy (calories) provided from food consumed to keep up with daily activities. Technically our body weight remains same as the calories consumed are equal to the calories burnt (providing the energy). Nevertheless, people tend to eat more than "burning" the calories consumed. Hence, the "non-burnt" calories are then converted into fats stored and the excessive fat causes weight gain.

Eating Behaviour of obese individuals may be the cause of their obesity. Several studies have pointed out that there is an association between eating behaviour and body mass index Samuel *et* al (2015); Ignacio *et* al. (2014); Goldschmidt *et* al. (2014); Nawab Khan, Abdul Hameed & Ismail (2011). There is need to understand eating behaviour among different groups of BMI namely normal, overweight and obese. Additionally, there are certain psychological factors linked with obesity. Factors such as stress Tajik *et* al. (2015); Wichianson *et* al. (2009) and depression Julie *et* al. (2014), have been associated with eating behaviour. Thus, a good intervention plan needs to be developed to address these issues as they affect eating behaviour of participants. Therefore, the current study addresses this need by examining the psychological factors associated with obesity.

II. OBJECTIVE

Primary aim of study was to examine differences in eating behaviour among obese, overweight and normal individuals with regards to 3 types of eating behaviour which are Cognitive Restraint, Disinhibition and Hunger. Studies have suggested a possible link between body weight and eating patterns.

Secondary aim was to determine if there are psychological factors related to obese, overweight or normal weight individuals. An individual's eating habit or dietary habit plays a crucial role in promotion and maintenance of health. In the aspect of psychological health it is important to determine if obese individuals have an increased risk of developing severe depression, somatic symptoms, anxiety and insomnia and social dysfunction.

Conceptual Definition of Obesity

Obesity can be defined as a medical condition in which a person possess excessive body fat accumulated that puts a person at risk of getting other diseases such as diabetes, heart diseases, stroke and cancers. Several common indicators of obesity are body weight, waist circumference, and hip circumference, waist-height ratio percentage of body fat, and body fat and muscle mass. By far the most popular method is via body weight calculating the Body Mass Index. **Operational Definition of Obesity**

Operational definition of obesity in this research is body mass index (BMI). Obesity can be determined by referring to body mass index chart, if BMI Weight status is below 18.5 is considered underweight, BMI = 18.5- 24.9 is normal, BMI = 25.0 – 29.9 is considered overweight, BMI = 30-34.9 comes under Obese (Class 1), BMI = 35-39.9 comes under Obese (Class 2) and BMI = 40 and above comes under Extreme Obesity (Class 3). For the purposes of this experiment individuals who are underweight and normal weight are both classified as "normal". On the other hand all three classes of obese are classed into a single class called "obese".

Conceptual Definition of Eating Behaviour

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

Eating behaviour is defined as behavioural responses or sequences associated with eating including modes of feeding, rhythmic patterns of eating, and time intervals. Disinhibition, cognitive restraint and hunger cause people to control their desire to eat, be it healthy or unhealthy.

Operational Definition of Eating Behaviour

Eating behaviour is operationally defined as the scores obtained from Eating Inventory that consists of three dimensions which are disinhibition, cognitive restraint and hunger. Disinhibition in eating behaviour can be defined as less restriction in eating, as it can be explained that one person could eat whenever and whatever he/she wants to eat, regardless the amount of calories or fats in food. High level of cognitive restraint means that a person strictly refrains from eating unnecessary food and high level of hunger indicates people eat whenever they feel hungry.

Conceptual Definition of Psychological Factors

Psychological health refers to overall state of mental wellbeing, thoughts and feelings, and cognitive characteristics which impacts on a person's attitude and functions of mind. **Operational Definition of Psychological Factors**

Psychological health can be measured from scores obtained from General Health Questionnaire-28 (GHQ-28). It comprises four scales, which are somatic symptoms, severe depression, social dysfunction, anxiety and insomnia. These traits are measured by using Likert scale, from 1 (not at all) to maximum 4 (much more than usual). However, the scoring used to calculate is by using the binary score.

III. METHOD

Cross-sectional survey was conducted to obtain data for all three administrations. Three types of self-reported standardized questionnaires in English language were used as screening tools, namely Eating Inventory, General Health Questionnaire-28 (GHQ-28) and a demographic questionnaire were administered on respondents. Sample consists of 100 UPSI students, 50 with BMI more than 25 kg/m^2 and 50 with BMI less than 25 kg/m^2. The respondents were randomly selected to voluntarily answer questionnaires and for their height and weight to be measured. 60% of students are females and 40% are males. Demographic characteristics of respondents are as follows:

Race: Malay respondents were 77 (77.0%), Chinese 5 (5.0%), Indian 7 (7.0%) and others 11 (11.0%).

Age: 28 respondents were less than 20 years of age, 62 respondents were from 21 to 25 years of age group and 10 were from 26 to 30 years of age group and above.

Education Level: Diploma 66 (66.0%), Bachelor's Degree 23 (23.0%), Master's Degree 8 (8.0%) and PhD 1 (1.0%).

The Anthropometric data was collected prior to answering questionnaires. The respondent's weight and height were measured in order to calculate the Body Mass Index (BMI) with the equation of BMI= weight in kilogram divided by height in meter squared (kg/m2) to reconfirm height and weight written. Eating Inventory comprised of 35 true-false items and 15 rating-scale items measures three dimensions, which are disinhibition, hunger and cognitive restraint of eating. Higher scores represent more frequent practice of restrained eating, dis-inhibited eating and eating due to feeling hungry. Each item scores either 0 or 1 point. The minimum score for factors I-II-III is therefore 0-0-0, the possible maximum score is 21-16-14.

Three dimensions of eating behaviour are divided into three Factors, factor I = cognitive restraint, factor II = disinhibition and factor III = hunger. People who score high in cognitive restraint are responsive or concern to caloric balance, nutrition and behaviour strategies for stimulus control. High score in cognitive restraint is important in making obesity treatment successful. It has been proven that positive treatment outcomes are predicted if cognitive restraint level is high Kramer, Stunkard & Marshall, (1988).

Furthermore, high scorers of factor II = disinhibition are also linked to emotional disinhibitors such as loneliness, depression and anxiety. There is evidence from research that low scores in disinhibition indicate a success for behavioural treatment programs for obesity. For factor III = hunger, people who benefited from programs that help in controlling hunger may get a high score and according to Wadden *et* al. (1986), persons that get benefits from the long-term use of appetite-suppressant medication were also score high in Hunger.

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

The overall reliability of Eating Inventory (EI) is α= 0.77. The internal consistency of each subscale ranged from 0.60 to 0.83. The lowest Cronbach's alpha score was Disinhibition (α= 0.60) whereas the highest was Cognitive Restraint (α = 0.83).

A factor analysis was conducted on Eating Inventory to determine construct validity of the inventory. The purpose of analysis was to identify three factors proposed by the authors which are Disinhibition, Cognitive Restraint and Hunger. Next, to determine number of factors the Kaiser Rule (Kaiser, 1960) was looked at first, which suggests only looking at those factors whose eigenvalues are greater than 1 which suggests a maximum number of factors to be 12 (please look at Table 1 for respective eigenvalues).

Then, Cattel Screen Test was utilised for Number of Factors Cattell (1966). Based on Screen Plot, two clear breaks were observed for factors with eigenvalues greater than 1. The breaks were at third and ninth factor. This suggests the total number of factors to be between three and nine. The final number of factors chosen was three due to the following considerations; 1) the first break of the Screen Plot was at the third factor and 2) this interpretation is supported by the manual which suggests a total of three factors. It should be noted that there is a possibility that there are nine factors but for the sake of brevity and the reasons stated above it was concluded that three factors was an appropriate assumption for the number of factors. (Refer table 1 eigenvalue of respective factors in table & figure section)

Based on the results of the analysis, some of the items were excluded from future analysis because their factor loadings did not meet the criterion set for factor loading which is 0.30. Some other items were removed because they were loaded on two different factors, both with similar value but one is positive while the other is negative. They are items 7, 21, 51, 17, 45, 16, 2, 22, 42, 31, 25 & 4, remaining items were reanalysed and once again it was examined to determine that factor loadings were above 0.30. In the end, analysis yielded three factors given in table 2 in table & figures section.

The three factors accounted for 35.02% of the variance. Factor 1 which comprises of 11 items from the Hunger subscale, 7 items from the Dis-inhibition subscale and merely two items from the Cognitive Restraint subscale of the Eating Inventory is interpreted as Hunger and Disinhibition subscale. One possible explanation for the interpretation is that the two subscales are measuring a similar construct or common ground which is loss of control over food intake. The only difference between the two subscales is the cause of loss of control which could be either physiological (hunger) or psychological (emotional). This finding is supported by researchers from Sweden Karlsson *et* al. (2000) and from Spain Diana Taboada *et* al. (2015). Overall, the results suggest that there is a previously unobserved heterogeneity in the Eating Inventory in Malaysian culture. Future researchers should take into account the possibility that the factor structure of the Eating Inventory is not suitable for their respective countries.

A reliability analysis has been conducted for interpreted factors. The reliability for factor, Hunger + Dis-inhibition (α= 0.70) and Cognitive Restraint 1 (α =0.80) are within the acceptable to good range. The only factor with a low reliability score is Cognitive Restraint 2 with α-score of 0.66. However, after inspecting the Cronbach's "Alpha if Item deleted" it was found that after deleting item 19 the reliability of subscale increased to 0.75.

General Health Questionnaire-28 (GHQ-28): Goldberg's 28 item scaled version of General Health Questionnaire was used to measure psychological aspects of eating behaviour. GHQ 28 is a 28-item measures emotional distress. Through factor analysis, GHQ- 28 has been divided into four subscales: Somatic Symptoms (items 1-7); Anxiety/insomnia (items 8-14); Social Dysfunctions (items 15-21) and Severe Depression (items 22 – 28).

The analysis of data for this study shows; the overall reliability of the GHQ-28 is 0.86. As for the subscales, there were only two subscales which were in the acceptable to good alpha score range which are Anxiety and Insomnia (α = 0.70) and Severe Depression (α= 0.83). The alpha values for rest of the subscales are as follows: Subscale Alpha (α), Overall Somatic Symptom 0.86, Anxiety and Insomnia 0.70, Social Dysfunction 0.58, Severe Depression 0.83.

IV. RESULTS

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

Data was analysed by using Statistical Package for Social Sciences 21 (SPSS 21). The descriptive analysis was used to obtain details of demographic data and also to summarise the mean scores of inventories. For inferential analysis, One-Way Analysis of Variance (ANOVA) was used to compare the mean scores between three groups of Body Mass Index which are Normal, Overweight and Obese.

Descriptive Analysis

Descriptive statistics was used in describing a set of data. It gives brief summary of analysed quantitative data (Howell, 2007). Mean scores for Hunger and Dis-inhibition subscale show that Obese (*M*= 11.11) group had highest mean followed by Normal group (*M*= 10.02) and lastly, the overweight group (*M*= 8.32). As for Cognitive Restraint 1, the mean scores ranged from 5.06 to 6.59. The overweight group (*M*= 6.59) had highest mean score whereas the normal group (*M*= 5.06) had lowest mean score. Lastly, for Cognitive Restraint 2, the normal group had the lowest mean score of 2.86 whereas the highest mean score 3.21 belonged to the obese group. For pattern of the scores please look at figure 1 in table & figure section.

As for General Health Questionnaire, same pattern can be observed for all four subscales which are somatic symptom, anxiety and insomnia, severe depression and social dysfunction. The mean scores for obese group were consistently highest among three groups followed by normal and lastly overweight. However, due to low reliability and validity of GHQ-28 in Malaysia because of cultural differences these findings may possibly do not reflect 100% true nature of psychological aspects of eating behaviour. Figure 2 shows pattern of GHQ-28 subscale scores in table & figure section.

Inferential Analysis

One-way ANOVA was used to compare differences in Eating Inventory subscale scores between three groups of Body Mass Index (Normal, Overweight and Obese). The results revealed a tendency for a significant difference between Obese (MDis + Hung = 11.71, S.D. = 4.74) and Overweight (MDis + Hung= 8.68, S.D. =4.64) group for subscale Disinhibition + Hunger, $F(2,97) = 2.89$, $p = 0.06$. There are no statistically significant differences between Normal and Obese and Normal and Overweight for all three subscale scores. Refer to Table 3 for result of ANOVA analysis in table & figures section.

V. DISCUSSION

Respondents answered the Eating Inventory by Albert, Stunkard & Messick (1985) which has 3 dimensions namely Cognitive Restraint, Disinhibition and Hunger. Factor analysis was used to examine factor structure of the Eating Inventory and results suggested an alternate factor structure, Cognitive Restraint 1- Cognitive Restraint 2- Disinhibition+Hunger. This study examined the differences among obese, overweight and normal weight students with regards to the dimensions of eating behaviour.

There was no significant difference in mean for subscale cognitive restraint 1 score among three groups of participants. It should be noted that despite the pattern was statistically insignificant; overweight group had the highest mean score which reveals that they had higher cognitive control over their eating as compared to obese and normal groups. Interestingly, the obese group and normal group had similar mean scores of 5.36 and 5.06 respectively. It means that obese group had similar level of cognitive control over their eating behaviour as the normal group. In other words the normal weight group had similar level of cognitive control over their eating behaviour as the obese group which indicates that they are at high risk of gaining weight in future.

Once again, for subscale Cognitive Restraint 2, the significant difference in mean scores among three groups of respondents was not found. However the pattern of results is different from the subscale Cognitive Restraint 1. In this case, obese individuals (M=2.53) had higher cognitive restraint 2 score as compared to overweight (M=2.27) and normal weight (M=2.28) individuals. It should be noted that there is not much difference between the scores. This is evident in the p-value which was 0.82 and it is extremely insignificant.

As for the third variable, Disinhibition+Hunger, findings of study says that there are significant differences in mean of Eating Inventory score among three BMI groups (normal, overweight and obese). Specifically, for the Hunger + Disinhibition subscale there is tendency for significance with p= 0.06. Interestingly, mean score between overweight and obese individuals

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

had greatest difference. The data suggest that there are differences in eating behaviour between obese and overweight individuals. Overweight individuals (MDis+Hung = 8.32) had a lower mean score which shows they were better able to regulate their eating behaviour in comparison with normal (MDis+Hung= 10.02) and obese groups (MDis+Hung= 11.11). It is interesting to note that, obese groups showed poorest control over regulation of their eating and eating behaviour is similar to that of normal BMI individuals. Studies have shown that there is no difference of eating pattern behaviour between obese and normal weight especially among Malaysian female adolescents, regardless of their same pattern of physical activities Wan, Kandiah & Taib, (2004).

One possible explanation is based on Theory of Planned Behaviour proposed by Ajzen, Lcek & Driver B L (1992), which suggests that an individual's intention to change behaviour can be predicted if he/she modifies behaviour. The best predictor of behaviour is intention. Overweight individuals, who are borderline obese, could possibly have an insight into their weight condition which provide them motivation for change resulting in scoring lower for disinhibition + hunger scale. This explanation however, presents an interesting assumption that the obese individuals were overweight at some point in their life, why they did not have the same insight?

Perhaps, in case of obese individuals' problem is not with insight, but there are other contributing factors such as poor self-control or self-regulation. It would be beneficial if future studies could investigate underlying mechanism behind obesity which could be used to design much more effective intervention methods. However this study interestingly reveals that normal weight individuals' eating behaviour is quite similar to the obese which indicates high risk for them to gain weight in future if they do not have control. These findings are very important for prevention of obesity.

As for GHQ-28 scores which consist of 4 different dimensions which are Somatic Symptoms, Anxiety and Insomnia, Social Dysfunction and Severe Depression. It was found that obese group were consistently scoring higher on Severe Depression, Social Dysfunction and Anxiety and Insomnia. Results indicate that wellbeing of obese individuals were much poorer as compared to overweight and normal BMI individuals.

Somatic symptoms score for GHQ is higher for Obese group (M=1.93) compared to Overweight (M=1.59) and normal weight (M=1.56). This could be due to excessive reflection about their body weight among the obese group. One possible explanation is that, their obsession with their body weight coupled with the constant reports in media about relationship of obesity to a number of illnesses may results in students exhibiting somatic symptoms. Additionally, they may exhibit somatic symptoms because of their inactive lifestyle. Being inactive leads to a decreased in physical fitness where obese individuals tend to experience shortness of breath after exercising for a short while. In addition to that due to accumulating cholesterol in arteries their hearts beat much harder to deliver blood to all parts of body. This might lead to think that there is something wrong with their physical health which is in some ways true because obesity has been linked with increased chances of developing cardiovascular diseases and a number of other diseases.

Social Dysfunction scores among Obese (M=1.89), Overweight (M=1.50) and Normal weight (M=1.78) shows that obese groups had a higher degree of social dysfunction. Past studies have associated obese individuals with low self-esteem and self-image. Because of that obese individuals do not look at themselves in a favourable way. In other words, they may have issues with social situations and some may even avoid social situations completely. This may affect their functioning in terms of social life. Furthermore, a number of occupations such as cashier, waiter, managers and teachers require employees to interact with other people. Individuals with low self-esteem may choose to avoid these jobs and as a result it may affect their lives.

Severe depression score is also highest among obese group (M=1.82) compared to overweight (M=1.64) and normal group (M=1.66). Studies have associated depression with increased food consumption (Goldschmidt et al., 2014). Marie-Pierre, Melodie and Veronique (2014) have even shown that when depressed there is a tendency for an individual to consume energy dense food which are high in carbohydrates. This pattern of eating behaviour associated with depression may lead to

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

obesity. However, it is unclear from the findings of this study whether depression leads to obesity or of obese individuals have a tendency to be depressed? Future studies should aim to determine the direction of the relationship.

Anxiety and insomnia results exhibited similar patterns with other subscales of GHQ, obese (M= 2.00) scored higher compared to normal (M=1.84) and overweight (M=1.55). Anxiety brings about a great deal of stress and high stress levels have been associated with increased eating (Adriana et al., 2013). The feeling of being "stressed" can be triggered by an event that makes people feel frustrated or nervous. Anxiety is a feeling of fear, worry, or unease. It can be a reaction to stress, or it can occur in people who are unable to identify significant stressors in their life. People under stress or experiencing anxiety tend to eat more in order to gain energy. In other words, anxiety leads to obesity. Furthermore, the obese individuals have tendency to be anxious about their weight constantly and this anxiousness is associated with stress which leads to eat more. It is a vicious circle of dieting and weight gain where obese individuals maintain their weight status despite of attempts to reduce their weight.

VI. CONCLUSION

Individuals in overweight group scored lower on Hunger + Dis-inhibition which suggested that they are able to control their food intake compared to obese group. Also pattern of results in descriptive statistics shows that obese individuals were consistently higher for GHQ-28 scores of Severe Depression, Anxiety and Insomnia and Social Dysfunction.

Acknowledgements

We would like to express our gratitude and appreciation to all those who gave us the possibility to complete this report. Special thanks to Sultan Idiris Education University (UPSI) for trust in giving University Research Grant 2015-0142-106-01 to conduct this study.

Particular appreciation must go to all research respondents who patiently and voluntarily participated in this research and made it possible to come up with findings. Thanks to everybody who directly or indirectly supported along the way.

VII. REFERENCES

[1] Albert J. Stunkard, Samuel Messick (1985). The three-factor eating questionnaire to measure dietary restrain, disinhibition and hunger. Journal of psychosomatic research volume 29.

[2] Aderibigbe, YA, Riley, W Lewin, T & Gureje, O. (1996). Factor structure of the 28-item General Health Questionnaire in a sample of antenatal women. International Journal of Psychiatry in Medicine, 26: 263-269.

[3] Ajzen, Lcek, Driver B L (1992). Application of theory of planned behaviour to leisure choice. Journal of Leisure Research; Arlington, Va., etc. Volume 24, issue 3.

[4] Cattell, R. B. (1966). The screen test for the number of factors. Multivariate Behavioral Research, 245-276.http://dx.doi.org/10.1207/s15327906mbr0102_10

[5] Cheong S M, Kandiah, M Chinna, K Chan, YM, & Saad, HA (2010). Prevalence of Obesity and Factors Associated with it in a Worksite Setting in Malaysia. Journal of Community Health

[6] Cheong, Siew ManKandiah, MirnaliniChinna, KaruthanChan, Yoke Munet al. Prevalence of Obesity and Factors Associated with it in a Worksite Setting in Malaysia [2010]

[7] Diana Taboada, Mercedes Navío, Rosa Jurado, Vanesa Fernández, Carmen Bayón , Mª José Álvarez, Isabel Morales, Guillermo Ponce, Gabriel Rubio, José Carlos Mingote, Felipe Cruz and Miguel Ángel Jiménez (2015). Factor structure and psychometric properties of the TFEQ in morbid obese patients, candidates to bariatric surgery. Psicothema 2015, Vol. 27, No. 2, 141-150

[8] Gan WY, Mohd Nasir, M T, Zalilah, MS& Hazizi, AS (2011). Differences in Eating Behaviours, Dietary Intake and Body Weight Status between Male and Female Malaysian University Students. Malaysian Journal of Nutrition, 17(2): 213-228.

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

[9] Goldschmidt AB, Crosby, RD, Engel, S Crow, SJ Gao, L Peterson, CB & Durkin N. (2014). Affect and Eating Behaviour in Obese Adults with and without Elevated Depression Symptoms. International Journal of Eating Disorder, 47:281-286.

[10] Ignacio, J L, Patricia, G C, Rocio, C C, Alejandro, M, & Immaculade R. P. (2014). Psychometric properties of Spanish version of the Three-Factor Eating Questionnaire-R18 (TFEQ-Sp) and its relationship with some eating- and body image-related variables. Nutrients, 6,5619-5635.

[11] Julie MG, Catherine, B Marie-Pierre, GG, Melodie, D & Veronique, P (2014). Depressive symptoms and food intake among weight-preoccupied women: Do eating behaviours and attitudes or BMI mediate this association? Health, 6: 2803-2813.

[12] J Karlsson, L-O Persson, L Sjotrom and M Sullivan (2000). Psychometric properties and factor structure of the Three-Factor Eating Questionnaire (TFEQ) in obese men and women. Results from the Swedish Obese Subjects (SOS) study. International Journal of Obesity volume24, pages1715–1725

[13] Kramer, m., Stunkard, a., & Marshall, k. (1988, march). Limited weight losses with an intragastric bubble. In psychosomatic medicine (vol. 50, no. 2, pp. 208-209). 351 west Camden st, baltimore, md 21201-2436: Williams & Wilkins.

[14] Lauzon BD, Romon, M Deschamps, V Lafay, L Borys, J Karlson, J Charles, MA (2004). The Three-Factor Eating Questionnaire-R18 is Able to Distinguish among Different Eating Patterns in a General Population. The Journal of Nutrition, 134(9):2371-2380.

[15] MaY Bertone, ER Stanek, EJ Reed, GW Hebert, JR Cohen, NL Ockene, IS (2003). Association between Eating Patterns and Obesity in a Free-living US Adult Population. American Journal of Epidemiology,158(1): 85-92.

[16] Marin-Guerrero, AC Gutierrez-Fisac, JL Guallar-Castillon, P Banegas, JR & Rodriguez-Artalejo, F(2008). Eating behaviours and obesity in the adult population of Spain. British Journal of Nutrition 100:1142-1148.

[17] McDowell AJ& Bond MJ (2001). Body Attitudes and Eating Behaviours of Female Malay Students Studying in Australia. South Pacific Journal of Psychology, 14:16-29.

[18] Mohamad WW Musa, KI Khir, AS Ismail, AA Ismail, IS Kadir, KA Wan Bebakar W (2010). Prevalence of overweight and obesity among adult Malaysians:An update. Asia Pacific Journal of Clinical Nutrition, 20(1), 35-41.

[19] Nawab Khan, MA, Abdul Hameed M & Ismail NE (2011). Eating habits and body weight profiles among undergraduate students in UiTM Puncak Alam, Selangor, Malaysia. Humanities, Science and Engineering, IEEE, 274-280.

[20] Nelson MC, Story M, Larson NI, NeumarkSztainer D & Lytle LA (2008). Emerging adulthood and college-aged youth: An overlooked age for weight-related behaviour change. Obese 16(10): 2205– 2211.

[21] Nurul-Fadhilah, A Teo, PS Huybrechts, I&Foo, LH (2013). Infrequent Breakfast Consumption is Associated with Higher Body Adiposity and Abdominal Obesity in Malaysian School-Aged Adolescents. PLoS ONE 8(3): e59297.

[22] Reilly, JJ Methven, E McDowell, ZC Hacking, B Alexander, D Stewart, L& Kelnar CH (2003). Health Consequences of Obesity. Archives of Diseases in Childhood, 88, 748-752.

[23] Samuel, M, L, Montserrat, B, G, Ana, A, A, & Arturo J, C (2015). Association of eating behaviours and BMI among elementary schools from Mexico. Nutricion Hospitalaria, 31(6): 2775-2777.

[24] S Atalic, Z Baric, I C & Keser I (2007). Diet quality in Croatian university students: Energy, macronutrient and micronutrient intakes according to gender. International Journal of Food Sciences and Nutrition, 58(5):398-410.

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

[25] Šataliæ Z, Bariæ IC & Keser I(2007). Diet quality in Croatian university students: Energy, macro-nutrient and micronutrient intakes according to gender. Int J Food Sci Nutr 58(5): 398–410.

[26] Tajik, E Latiffah, AL Awang, H Asyura, AS Chin, YS Shah, AA Hariz C M.(2015). Unhealthy diet practice and symptoms of stress and depression among adolescents in Pasir Gudang, Malaysia. Obesity Research & Clinical Practice.

[27] Wan, PL Kandiah, M & Taib, M M (2004). Body Image Perception, Dietary Practices and Physical Activity of Overweight and Normal Weight Malaysian Female Adolescents. Malaysia Journal of Nutrition, 10(2): 131-147.

[28] Wadden, Thomas A.,Stunkard, Albert J. (1986) Controlled trial of very low calorie diet, behavior therapy, and their combination in the treatment of obesity.Journal of Consulting and Clinical Psychology, Vol 54(4), Aug, 482-488

[29] Wan Nazaimoon W.M., Kamarul I.M., Amir Sharifuddin M.K., Aziz al-Safi I., Ikram Shah I., Khalid A.K., Nor Azmi K., Nor Azwany Y., Norlaila M., Osman A., Siti Harnida M.I., Wan Mohamad W.B. 2011.Prevalence of overweight and obesity among adult Malaysians: an update. Asia Pac J Clin Nutr. 20 (1):35-41.

[30] Wichianson, JR Bughi, SA Unger, JB Sprujit-Metz D & Nguyen-Rodriguwz ST (2009). Perceived Stress, Coping and Night-Eating in College Students. Stress and Health, 25:235 – 240.

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

1 Table 1 Eigenvalue of Respective Factors

Factor	Initial Eigenvalues		
	Total	% of Variance	Cumulative
1	6.506	16.681	16.681
2	5.024	12.881	29.563
3	2.156	5.529	35.092
4	1.859	4.766	39.858
5	1.688	4.328	44.186
6	1.528	3.918	48.104
7	1.413	3.623	51.727
8	1.365	3.499	55.226
9	1.241	3.181	58.407
10	1.136	2.912	61.320
11	1.114	2.857	64.177
12	1.039	2.664	66.841
13	.986	2.529	69.370
14	.864	2.215	71.584
15	.837	2.147	73.732
16	.819	2.101	75.832
17	.767	1.966	77.798
18	.749	1.921	79.719
19	.678	1.738	81.457
20	.662	1.698	83.155
21	.603	1.546	84.701
22	.577	1.480	86.181
23	.544	1.394	87.576
24	.518	1.327	88.903
25	.487	1.248	90.151
26	.438	1.122	91.273
27	.415	1.065	92.338
28	.394	1.011	93.350
29	.366	.939	94.288
30	.334	.856	95.145
31	.307	.788	95.933
32	.285	.730	96.662
33	.244	.627	97.289
34	.243	.623	97.913
35	.203	.520	98.433
36	.185	.474	98.906
37	.169	.433	99.340
38	.138	.354	99.694
39	.120	.306	100.000

2

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

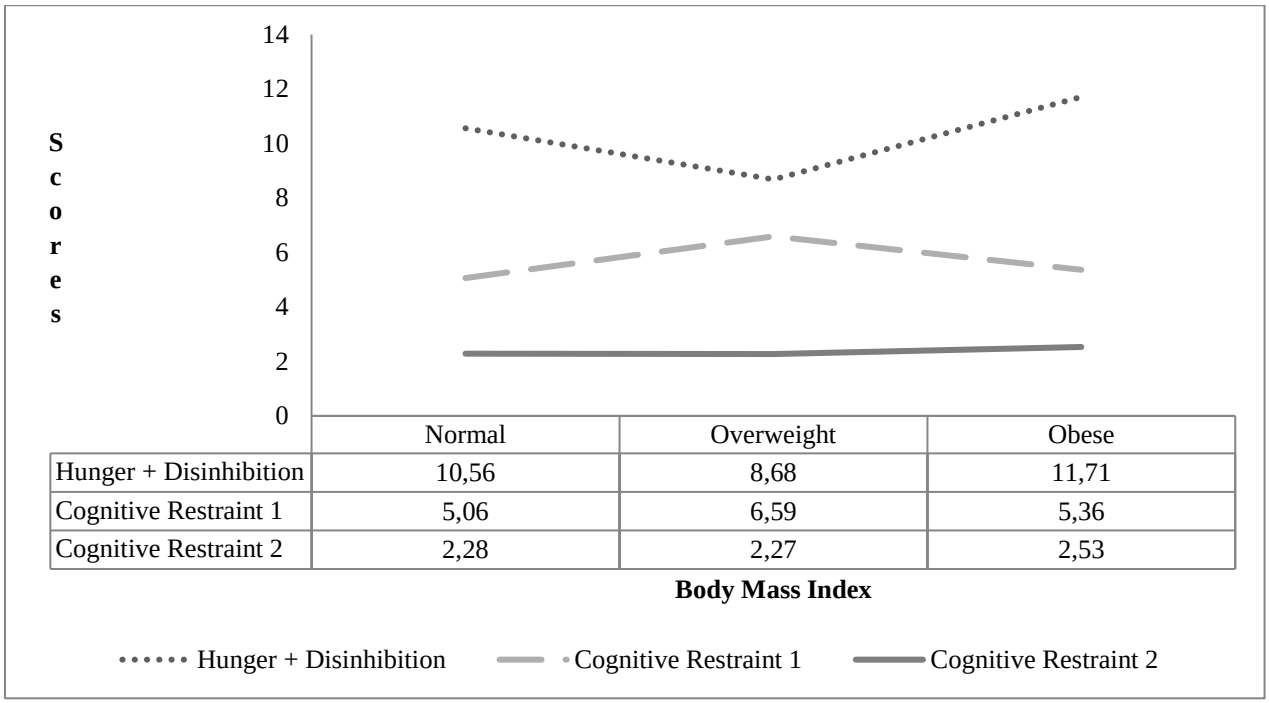
3 Table 2 Interpretation of Eating Inventory

Factor	Items	Interpretation of the Factor
1	39, 15, 26, 24, 34, 20, 27, 9, 47, 12, 41, , 3, 1, 13, 8, 30, 36, 5 & 29.	Hunger and Dis-inhibition
2	37, 40, 38, 10, 6, 28, 50, 33, 44, 18, 23 & .	Cognitive Restraint 1
3	48, 32, 14, 46, 43, 19 & 11	Cognitive Restraint 2

4

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

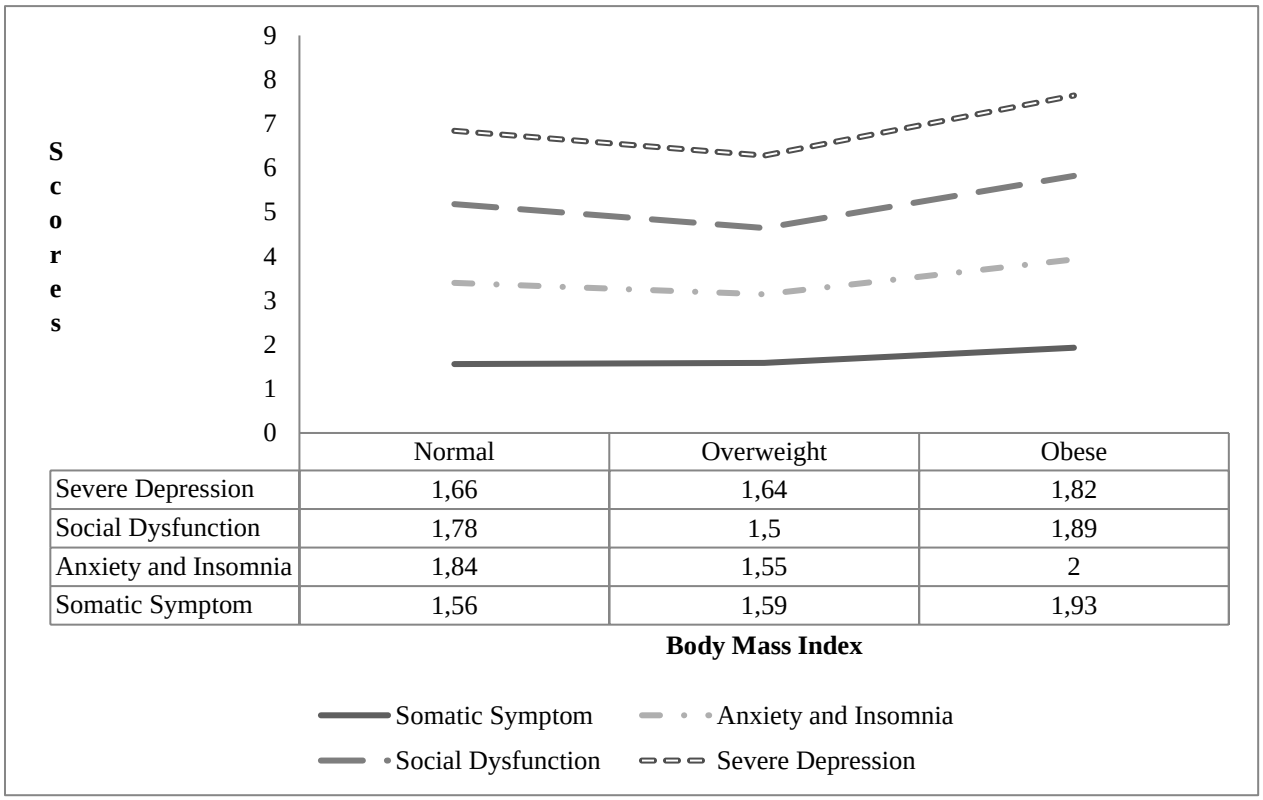
Figure 1 Eating Inventory score by BMI



	Normal	Overweight	Obese
Hunger + Disinhibition	10,56	8,68	11,71
Cognitive Restraint 1	5,06	6,59	5,36
Cognitive Restraint 2	2,28	2,27	2,53

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

7 Figure 2 GHQ scores by BMI



	Normal	Overweight	Obese
Severe Depression	1,66	1,64	1,82
Social Dysfunction	1,78	1,5	1,89
Anxiety and Insomnia	1,84	1,55	2
Somatic Symptom	1,56	1,59	1,93

8

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019

Table 3 ANOVA Analysis Results for Eating Behavior and BMI Groups

Subscale		*S.S.*	*df*	Mean Square	*F*	*p*
Hunger + Disinhibition	Between Groups	114.10	2	57.05	2.89	.06
	Within Groups	1916.81	97	19.76		
Cognitive Restraint 1	Between Groups	36.39	2	18.20	2.03	.14
	Within Groups	868.57	97	8.95		
Cognitive Restraint 2	Between Groups	1.34	2	.67	.20	.82
	Within Groups	323.408	97	3.334		

Received: 10 Nov 2018 | Revised: 20 Dec 2018 | Accepted: 02 Jan 2019