

Eating behaviours of normal and overweight female undergraduate students in positive and negative emotions

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Abstract

Emotional well-being affects eating behaviour, whether making an individual eat less or more than they normally do. This paper aimed to compare eating behaviour between normal and overweight female undergraduate students in response to positive and negative emotions. This cross-sectional study was conducted among 166 female university students. Data collection involved the assessments of participants' anthropometric measurements to obtain body mass index (BMI) and two self-administered questionnaires to measure of eating behaviour in positive and negative emotions; Emotional Appetite Questionnaire (EMAQ) and Eating Junk Food Questionnaire (EJFQ). Data from the two groups were compared to obtain differences in eating behaviour between normal and overweight female undergraduate students in response to positive and negative emotions. Both normal (Mean = 5.96±1.05) and overweight (Mean = 5.60±0.81) participants reported no changes in the levels of eating under positive emotions. The results also showed that both BMI categories "ate less" when they experienced negative emotions. For EJFQ, there was no significant difference in eating junk food between normal and overweight participants in response to positive emotions. However, the results revealed that the overweight group has more tendency to choose pizza ($X^2(1) = 6.879$), $p = 0.009$) and cake ($X^2(1) = 7.458$, $p = 0.006$) than the normal group under negative emotions. These results offer an insight that both BMI groups have almost similar eating-related concerns and thus intervention programs can be constructed on distressing eating-related thoughts and emotions among female undergraduate students.

1. Introduction

Global Health Observatory (GHO) data revealed that the prevalence of overweight and obese women aged 18 and above in 2016 were 39% and 15% respectively. A marked increase was observed in both overweight and obesity prevalence over the past four decades (World Health Organization, 2019). Concerns over this matter arise as overweight and obesity may lead to other health conditions, as well as psychological implications such as eating disorders; with more than one-third of the obese female students were prone to have eating disorders (Pahlavie *et al.*, 2020). On the other hand, Evers *et al.* (2013) suggested that excessive food intake is now a new concern rather than the shortage of food and starvation. One of the reasons for excessive food intake may be due to the changes in emotions and moods of an individual (Evers *et al.*, 2013; Yau and Potenza, 2013).

It has been well documented that emotions may regulate eating (Macht, 2008; Koski and Naukkarinen, 2017). Emotional states such as feeling joy or sadness can trigger the decision to eat (Soliah, 2010; Koski and Naukkarinen, 2017) and can also influence food choice (Flaskerud, 2015). Some individuals increase their food intake (Barthomeuf *et al.*, 2009), while other individuals decrease their food consumption when dealing with negative emotions. For instance, boredom was associated with increased energy intake as well as the higher consumption of fats, carbohydrates and proteins (Moynihan *et al.*, 2015) while sadness has been found to decrease one's appetite (Macht *et al.*, 2002). Therefore, it can be concluded that emotions, positive or negative, influence eating behaviours in several complex ways.

Eating as a response to negative emotions is known

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as emotional eating – eating that is associated with an increase in body mass index (BMI) (Czeczor-Bernat and Brytek-Matera, 2020) and may lead to obesity (Nolan *et al.*, 2010) due to the tendency to overeat (Köster and Mojet, 2015; Frayn *et al.*, 2018). An emotion regulation strategy is a biological approach that views emotional eating as an act of displacement that aims to reduce arousal or unpleasant feelings (Macht, 2008). The strategy presumes that unfavourable emotions would be alleviated and improved after emotional eating (Leehr *et al.*, 2015). It is a method that hides stress and improves one's mood as palatable foods are usually found to immediately uplift one's mood, gives positive effects and reduces the impact of distress (Tice *et al.*, 2001; Macht, 2008; Evers *et al.*, 2010).

Emotional eaters may become overweight or obesity because they tend to eat for motives other than hunger (Bilici *et al.*, 2020). Overweight and obese people are found to engage in emotional eating more than people with normal weight (Tice *et al.*, 2001) due to their lack of awareness on their hunger and satiety cues compared to people with normal weight (Köster and Mojet, 2015) which can trigger their weight to increase (Bilici *et al.*, 2020). This evidence suggested that BMI becomes a new concern along with the emotions and eating behaviours as portrayed in several studies. For example, Nolan and his colleagues (2010) conveyed that there is a significant correlation between negative emotions and BMI, such that the tendency of increased or insufficient consumption during negative emotions may lead to obesity and overweight; also, underweight.

Particularly, an individual with higher BMI status tends to have increased hunger-eating in response to negative emotions while low BMI's individuals show increased hunger-eating during positive emotions (Reichenberger *et al.*, 2018). Arslan and Aydemir (2019) also observed that individuals with higher BMI are associated with increased emotional appetite during negative emotions and situations, and they are also related to disturbed eating attitudes. These scenarios may be explained by the Psychosomatic Theory of Obesity by Kaplan and Kaplan (1957), in which it describes that obese people tend to consume more in distress situations as it would relieve their anxiety. Thus, the present study hypothesized that overweight individuals are more likely than normal-weight individuals to eat more in response to negative emotions and situations.

2. Methodology

2.1 Participants

A total of 166 female participants were recruited through convenience sampling with concerns to the

inclusion and exclusion criteria which were set prior to the data collection. The inclusion criteria included were the students must be female, undergraduate students, and the BMI status in the range of normal weight or overweight or obesity according to the World Health Organization (2017) reference. Participants with overweight or obesity are identified as overweight throughout this study. Individuals were excluded if they were on a dieting plan or on a restriction of any food intake to lose weight or/and the students had a psychiatric illness that could interfere with eating behaviours. These questions were asked in the demographic background section.

2.2 Measures

2.2.1 Body mass index (BMI)

Participants had their anthropometric measurements assessed using SECA Portable Stadiometer and SECA Bathroom Scale. SECA Portable Stadiometer is a tool used to measure the height of the participants, while SECA Bathroom Scale is used to obtain the weight of the participants. Participants' BMI status was obtained from the calculation of weight (kg)/height (m)² and they were classified into two categories; normal (18.5 - 24.9 kg/m²) and overweight or obesity (> 25.0 kg/m²) according to the WHO classification of BMI (World Health Organization, 2017).

2.2.2 Eating behaviour based on emotions and situations

Participants were provided with the Emotional Appetite Questionnaire (EMAQ), adopted from Nolan *et al.* (2010). EMAQ is composed of ratings of the tendency to eat in response to both positive and negative emotions (14 items) and assessing food intake in response to positive and negative situations (8 items). Response options were on a nine-point scale and included: "ate less" (from 1 to 4), "the same" (5), or "much more" (from 6 to 9). Options such as NA (Not Available) and DK (Don't Know) were also included in the questionnaire but excluded from the scoring. A score for each domain (positive emotions, negative emotions, positive situations and negative situations) is determined by finding the average of each domain. EMAQ has demonstrated adequate internal consistency, with α ranging from 0.57 to 0.87 (Nolan *et al.*, 2010; Taber, 2018) and it is also found to demonstrate a good construct validity (Nolan *et al.*, 2010).

2.2.3 Junk food eating behaviour

A list of ten junk foods that participants were more likely to consume during positive and negative emotions was also given to the participants to answer. It refers to

Eating Junk Food Questionnaire (EJFQ) and was adopted from the Malaysian Adult Nutrition Survey (Institute for Public Health, 2014). Each junk food item is provided with a 'yes' or a 'no' answer options. Participants may choose more than one junk food in EJFQ, respectively for both positive and negative emotions, based on their preferences. The internal consistency of the ten items used in this study was 0.686.

2.3 Statistical analysis

Statistical analysis were performed using Statistical Package for the Social Sciences (SPSS) version 22. Descriptive statistics (mean, percentages, standard deviations and frequency) were used to describe the demographic data and the scores for eating behaviour. An independent t-test was performed to observe the differences between normal weight and overweight groups for EMAQ, and a Chi-square test was used to compare junk food eating behaviour between normal weight and overweight participants in EJFQ.

2.4 Ethical approval

The approval to conduct the study was obtained from IIUM Research Ethics Committee (IREC) prior to data collection (Approval ID: IREC 2018-129). The consent was obtained from the participants prior to data collection.

3. Results

3.1 Sociodemographic characteristics

A total of 166 female participants were assessed and they were in the age range between 19 to 25 years, with an average age of 21.66 ± 1.50 years. The mean height of the participants was 1.55 ± 0.057 meters while the mean weight was 55.22 ± 9.77 kilograms. The average BMI was 23.03 ± 3.64 kg/m². Specifically, 123 participants were found to have normal weight giving a rate of 74.1%.

3.2 Emotions and situations affecting eating behaviours

Table 1 shows the means of overall scores and the p-values of emotions and situations affecting eating behaviours in normal weight and overweight participants. There was a significant difference in the scores of eating behaviour in normal weight and overweight females when they were in positive emotions ($t = 2.070$; $p = 0.040$). However, the mean values showed that the participants eat "the same" for both normal (Mean = 5.96 ± 1.05) and overweight (Mean = 5.60 ± 0.81) participants in response to positive emotions.

For eating behaviour in response to negative emotions, overweight participants reported significantly greater mean levels of eating as compared to normal-

weight participants (4.90 ± 0.75 vs 4.48 ± 1.01 , $p = 0.005$). The results showed that both BMI categories "ate less" when they experienced negation emotions. On the other hand, no significant difference could be observed in eating behaviour in normal weight and overweight students when they were in positive and negative situations.

Table 1. Mean scores of EMAQ based on emotions and situations in normal weight and overweight participants (n = 166)

Characteristics	Normal weight Mean±SD	Overweight Mean±SD	p-value
Positive Emotion	5.96±1.05	5.60±0.81	0.040*
Negative Emotion	4.48±1.01	4.90±0.75	0.005*
Positive Situation	6.02±1.15	5.93±1.07	0.648
Negative Situation	3.66±1.12	3.79±1.11	0.505

* $p < 0.05$

Table 2 summarises the mean and p-value of each emotion and situation that affected eating behaviour between normal weight and overweight female students. Of the negative emotions, two emotions showed significant differences in eating behaviour between normal weight and overweight female students. These include sad ($t = -2.451$; $p = 0.015$) and frustrated ($t = -2.626$; $p = 0.009$). Specifically, overweight participants were more likely to eat "the same" than normal-weight participants who were "eating less" in response to both sad and frustrated emotions. However, for the specific positive emotions and situations, no significant difference could be observed for any of the emotions nor the situations listed in normal weight and overweight students.

3.3 Eating junk food choice between normal and overweight participants in response to positive and negative emotions

Table 3 tabulates the percentages and the p-values of junk food choice than normal weight and overweight participants were most likely to choose under positive and negative emotions. It was found that there was no significant difference between normal and overweight participants with regard to eating junk food in response to positive emotions. On the other hand, the results revealed a significant difference in eating junk food between normal and overweight participants in response to negative emotions, particularly cake ($X^2(1) = 7.458$, $p = 0.006$) and pizza ($X^2(1) = 6.879$, $p = 0.009$). It was observed that the overweight participants were more likely to consume cake and pizza than the normal weight group under negative emotions.

4. Discussion

4.1 Emotions and situations affecting eating behaviours

Table 2. Eating behaviours based on various emotions and situations in normal weight and overweight participants (n = 166)

Emotions/Situations	Normal weight Mean±SD	Overweight Mean±SD	p-value
List of Emotions			
Sad	4.33±2.14	5.26±2.14	0.015*
Bored	6.54±1.73	6.67±1.34	0.635
Confident	5.28±1.64	4.91±1.53	0.187
Angry	4.58±2.04	4.53±1.89	0.905
Anxious	3.47±1.82	3.37±2.09	0.767
Happy	6.89±1.52	6.40±1.42	0.065
Frustrated	4.68±2.08	5.65±2.09	0.009*
Tired	3.83±1.96	4.30±2.01	0.178
Depressed	3.93±2.32	4.65±2.55	0.092
Frightened	2.87±1.45	2.79±1.42	0.757
Relaxed	5.72±1.40	5.33±1.15	0.069
Playful	5.94±1.70	5.79±1.25	0.591
Lonely	5.08±2.30	5.67±1.71	0.079
Enthusiastic	5.21±2.06	5.21±1.55	0.995
List of Situations			
After receiving good news	6.46±1.36	6.44±1.33	0.955
When engaged in an enjoyable hobby	5.84±1.73	5.63±1.43	0.478
When under pressure	4.19±2.10	4.37±2.25	0.626
After a heated argument	4.10±1.80	4.28±1.87	0.574
When falling in love	4.28±2.80	3.47±2.73	0.098
After losing money or property	2.71±1.41	3.12±1.74	0.125
After the tragedy of someone close to you	2.83±1.72	2.65±1.43	0.543
After ending a relationship	2.57±2.55	2.19±2.48	0.395

*p < 0.05

Table 3. Junk food choice in normal weight and overweight participants under positive and negative emotions (n = 166)

List of foods	Positive Emotions			Negative Emotions		
	Normal weight n (%)	Overweight n (%)	p-value	Normal weight n (%)	Overweight n (%)	p-value
Chocolate	83 (67.5%)	25 (58.1%)	0.263	65 (52.8%)	29 (67.4%)	0.096
Instant noodle	23 (18.7%)	12 (27.9%)	0.203	44 (35.8%)	11 (25.6%)	0.222
Cake	69 (56.1%)	25 (58.1%)	0.816	21 (17.1%)	16 (37.2%)	0.006*
Fried chicken	65 (52.8%)	22 (51.2%)	0.849	20 (16.3%)	9 (20.9%)	0.488
Pizza	63 (51.2%)	22 (51.2%)	0.995	10 (8.1%)	10 (23.3%)	0.009*
Nugget	31 (25.2%)	12 (25.9%)	0.728	14 (11.4%)	8 (18.6%)	0.229
Burger	61 (41.5%)	12 (27.9%)	0.115	22 (17.9%)	8 (18.9%)	0.916
Carbonated drink	17 (13.8%)	2 (4.7%)	0.162	18 (14.6%)	4 (9.3%)	0.375
Junk food/Snack	41 (33.3%)	11 (25.6%)	0.345	52 (42.3%)	11 (25.6%)	0.052
French fries	40 (32.5%)	14 (32.6%)	0.996	22 (17.9%)	5 (11.6%)	0.338

*p < 0.05

The results showed that both normal weight and overweight participants were reported to have no changes in the level of eating in response to positive emotions, suggesting that both BMI groups had good control of the food they ate. Positive-mood maintenance theory might be the explanation for this finding, in which it describes that individuals who were having positive emotions and moods process only positive information and avoid negative activities (Handley *et al.*, 2004). Therefore, overeating or perhaps under-eating could be avoided under positive emotions to maintain the positivity of oneself.

The present study also found that the participants in both BMI groups reduced their food intake when experiencing an array of negative emotions. Contrary to the findings of Barthomeuf *et al.* (2009), we did not find any overeating occurring in people under negative emotions. Macht (2008) conducted a review on the influence of emotions on an individual's eating and he found that 48% of them experienced a decrease in appetite in response to emotional stress. This finding was also supported by a study conducted by Bongers *et al.* (2013), where they discussed that there was no significant result that showed an increase in food intake

in response to negative emotions, and stressful situations led to decreased taste-eating instead.

There are several explanations for the relationship between negative emotion and a decrease in food consumption. For example, it was found that stress and negative emotions induced physiological changes in the body that was similar to satiety or a state of fullness (Adriaanse *et al.*, 2011), which indirectly prompted someone to eat less or lose their appetite (Bilici *et al.*, 2020). Although the present study did not investigate the severity of emotion, Macht (2008) suggested that individuals who were under chronic sadness were likely to experience behavioural deactivation and withdrawal symptoms which inhibited normal eating habits.

4.2 Eating junk food choice between normal and overweight participants in response to positive and negative emotions

It was further discovered that overweight students were more likely to consume both cake and pizza than the normal weight group in response to negative emotions. There was evidence in the literature that individuals with overweight and obesity tended to have depressive symptoms due to criticism and negative judgement received from society towards their physical appearance (Varela *et al.*, 2009). In addition, the individual with overweight and obesity might have less effective coping skills (Ozier *et al.*, 2008) and poor emotional regulation strategy in response to negative emotions. As a consequence, individuals with overweight and obesity indulged themselves in high-calorie and high-sugar foods (Frayn *et al.*, 2018) to compensate for their negative emotions. When an individual binge-ate, the attention was directed more to the food instead of their cognitive feelings which allowed them to avoid dwelling in the negative thoughts and made it easier for them to cope with the unpleasant emotions (Evers *et al.*, 2010).

Other than using eating as a way to regulate emotions, eating was also used as a coping strategy to handle negative feelings (Leehr *et al.*, 2015). It is worth to point out that people who practised eating as a coping strategy were more likely to sustain a high BMI and this was more frequent among overweight and obese people (Dressler and Smith, 2013). According to the emotional regulation strategy, people engaged in emotional eating to relieve their sadness (Barthomeuf *et al.*, 2009) or to regulate and escape from negative emotions (Gianini *et al.*, 2013). This could explain to why having psychological issues such as depression or anxiety were linked with obesity (Varela *et al.*, 2009).

The findings of this study are substantial to help

tackle the currently endemic issue of weight problems especially among female university students who are easily affected by emotions and engaging in unhealthy eating behaviours. There are some limitations identified in this study. The first limitation concerns the participants of the study, in which data of participants of higher BMI is limited due to the refusal of participation from some students especially from those who self-perceived themselves as having higher BMI. In addition, the smaller number of overweight than normal-weight participants might lead to bias in interpretation when comparing eating behaviour between normal and overweight participants. The second limitation is related to the questionnaire, specifically EJFQ in which it only measured junk food intake. Although it is widely established that people with overweight and obesity are likely to indulge themselves with junk food, including other types of foods on the questionnaire would be beneficial in order to get a comprehensive understanding of eating habits in response to both positive and negative emotions.

5. Conclusion

In conclusion, although there were differences in eating behaviour between normal weight and overweight students (i.e. eating less or eating the same), none of the BMI groups reported overeating in response to positive and negative emotions. However, overweight female students were likely than normal-weight female students to eat some junk foods under negative emotions. These results offer an insight that students regardless of BMI status have eating-related concerns. The results may also have implications for the development of intervention programmes that focus in distressing food-related thoughts and emotions, especially among young adults with excessive weight.

Conflict of interest

All authors declare no conflict of interest pertaining to this study.

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