Emotional eating behavior among University of Bahrain students: a cross-sectional study

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ABSTRACT

Given that the transition to university is a stressful experience, the present study aimed to assess how emotions affect eating behavior among students from the University of Bahrain. This was a cross-sectional study on 169 undergraduates, aged 17 to 36 years (average age, 20 ± 3 years), who completed an online survey that included questions based on the validated Emotional Appetite Questionnaire. The results showed that neither gender nor marital status had an effect on the reported eating behavior under different emotional states. Moreover, the majority of students reported eating less during negative emotional states (fear, sadness, anger, stress and depression). However, under loneliness and happiness, students tend to either sustain their food intake (45.6% and 55.0%, respectively) or to increase their food intake (32.0% and 39.6%, respectively). Results also revealed that the majority of students (71.6%) identified boredom as a trigger for emotional eating, but were less likely to experience guilt. Further, students tend to turn to high calorie, high fat foods during emotional eating episodes. Our findings underline the need to develop a multidisciplinary intervention strategy to improve the diet and eating habits of university students, with the goal of reducing the risk of obesity and related diseases.

1. Introduction

Obesity is a major health concern since it is associated with increased risk for chronic conditions such as heart disease, diabetes, and certain cancers (Dixon, 2010). According to data from the World Health Organization (WHO) in 2016, 39% of adults were overweight and 13% were obese globally (WHO, 2016). In the kingdom of Bahrain, 28.9% of males and 38.2% of females aged 20 years and more were classified as obese (WHO, 2015). The increase in the prevalence of obesity in Bahrain and around the world seems to coincide mainly with lifestyle and environmental changes that have led to increased energy intake and reduced level of physical activity (Musaiger et al., 2011).

Young adults are an important group to consider for interventions targeting obesity prevention since unhealthy behaviours acquired at this age may persist into older adulthood (Doak, Visscher, Renders, & Seidell, 2006). The transition to the university can be a stressful time for young adults, which make them more susceptible to weight change (Racette, Deusinger, Strube, Hightstein, & Deusinger, 2005). Several studies have indicated that university students with higher levels of stress usually consumed more energy-dense, hyperpalatable foods and are less likely to exercise, which could lead to obesity and related metabolic disorders (Carter, Elzubeir, Abdurazzaq, Revel, & Townsend, 2003; Lee, Ahmed, Pathirana, & Papier, 2016).

Emotional eating refers to overeating or undereating in response to negative emotional states such as anger, stress or anxiety (Greeno & Wing, 1994; Macht, 2008). Emotional eating has been associated with excessive intake of energy-dense and high-fat foods (Nguyen-Rodriguez, Chou, Unger, & Spruitt-Metz, 2008), higher weight status (Geliebter & Aversa, 2003; Laitinen, Ek, & Sovio, 2002), obesity (Goldschmidt et al., 2017), eating disorders such as bulimia nervosa and binge eating disorder (Eldredge & Agras, 1996; Ricca et al., 2009), and depression (Masheb & Grilo, 2006). Other studies, on the other hand, have shown that emotional eating was not associated with energy intake and macronutrient, mainly fat and carbohydrates, consumption (Anschutz, Van Strien, Van De Ven, & Engels, 2009; Lluch, Herbeth, Méjean, & Siest, 2000). Such inconsistencies make it difficult to...
expect how an emotion will affect the eating habits of an individual. Furthermore, different emotions may increase or decrease food consumption in the same person (Macht, 2008). For example, negative emotions like boredom may be associated with increased appetite, but sadness with decreased appetite (Bennett, Greene, & Schwartz-Barcott, 2013). Nonetheless, other observations have shown that motivation to eat is associated with emotional state. High arousal emotions such as anger and happiness, for instance, have been shown to increase desire to eat (Bongers, Jansen, Havermans, Roefs, & Nederkoorn, 2013; Patel & Schlundt, 2001), while low arousal negative emotions such as sadness have been shown to decrease food intake (Macht, Roth, & Ellgring, 2002).

The purpose of this study, the first of its kind in Bahrain and other Arabian Gulf countries, was to assess how various emotions that students from the University of Bahrain (UOB) perceive influence their eating habits. As secondary endpoint, the study examined the differences among various emotions with respect to the alternation they induce on the students’ eating behavior and even, the food choice under different emotions was considered in the study.

2. Materials and methods

2.1. Participants and study setting

The cross-sectional study was carried out among female and male undergraduate students (from 17 to 36 years) attending the UOB during the fall 2017 semester. For the purpose of data collection, an online questionnaire survey (Google Forms) was used and conveniently distributed to the participants via WhatsApp application. Informed consent was obtained by clicking “yes” on the introduction page of the survey. The study was approved by the Ethics Committee of the Department of Biology of the UOB. The questionnaire was available in two languages (English and Arabic). The questionnaire was pretested for reliability and readability in another group of UOB students. Students on weight reduction diets or suffering from a chronic disease such as diabetes and those who were pregnant or lactating were also excluded.

The questionnaire consisted of four parts. The first part included questions on demographic characteristics such as age, gender, marital status, self-reported weight and height, and whether or not the respondent was pregnant or lactating. Additional questions asked respondents about medical history, including dietary and smoking status. The second part included questions on psychological factors (emotions) that influenced dietary habits of respondents. Specifically, eight different emotions have been considered (sadness, boredom, anger, happiness, stress, depressed, fear and loneliness). Emotional eating was assessed using questions based on the validated Emotional Appetite Questionnaire (Nolan, Halperin, & Geliebter, 2010). For each emotion category, the amount of food consumed was assessed using the response options much less than usual (1), the same as usual (2) and much more than usual (3). The third part of the questionnaire included questions on the type of foods usually consumed in relation to emotional eating. Respondents were asked to select from a specific list of food items organized into four categories on the basis of calorie content and taste: high-calorie sweet, low-calorie sweet, high-calorie savory and low-calorie savory. A fifth option was also included that read “not applicable.” The final section of the questionnaire looked at the respondents’ own perceptions regarding their emotional eating behavior by asking them whether they perceived themselves as being emotional eaters or not, when it was first realized, and whether they felt guilty towards such behavior. In addition, there were two questions about whether the respondent perceived emotional eating as a problem, and if so, to suggest possible solutions.

2.2. Statistical analysis

Analysis of the data was performed using the Statistical Programming Language R version 3.5.1 (R Core Team, 2018). Data was summarized in terms of frequency and percentage, beside the mean and standard deviation (for quantitative variables such as age and BMI). The variable of interest (response variable) is the food intake which is a qualitative variable represented by a 3-likert scale (self-reported score). Accordingly, the non-parametric descriptive and inferential statistics have been used. More concretely, the first quartile, the median, and the third quartile were calculated for the food intake under each emotion of concern (see Supplementary Information).

The within-subject comparisons have been considered to assess how students’ food intake differs as a response to various emotions. More specifically, food intake, which represents the response variable, was reported under eight emotional states (explanatory variable) for each UOB student in the study sample. These emotional states were then compared with respect to their effect on students’ food intake using Friedman test (overall test) and Wilcoxon Signed-Rank test (post-hoc test) to account for repeated measures. The adopted analysis is similar to that of Udo et al. (2013) where the repeated measures analysis was conducted to compare the
latency to start eating between positive and negative mood imagery conditions (within-subject effect). Moreover, it is acknowledged that there is a possibility when some of the emotional states occur together, a realization that might violate the independence assumption between the eight emotions under consideration. However, the students were asked to score their food intake when the emotion of concern is the dominant emotional state (in terms of intensity). Therefore, the conducted comparisons to differentiate emotions with respect to their effect on students’ food intake are considered to be reasonable.

The between-subject comparisons were considered to test for differences in the students’ food intake between groups defined by demographic factors (gender, marital status and BMI). More specifically, UOB students were classified according to the demographic factor of interest. Then food intakes of students in these classes as a response to a specific emotion were compared. Accordingly, Kruskall-Wallis test (overall test) and Mann-Whitney test (post-hoc test) were implemented to compare eating behavior under certain emotion for students classified according to their demographic characteristics.

The level of significance was set to 5% for overall comparisons and was modified to account for multiple testing using Bonferroni correction.

3. Results and discussion

3.1. Socio-demographic characteristics

Demographic characteristics of the respondents are summarized in Table 1. After applying the inclusion/exclusion criteria, the study sample included 169 students representing 138 (81.7%) females and 31 (18.3%) males. This over-representation of females is in line with the greater proportion (65%) of female students enrolled at UOB during the academic year of 2016–2017 (Alnaser, 2017). The students ranged in age from 17 to 36 years (mean age 20 ± 3 years) and the majority (85.8%) was single, with 14.2% reporting that they were married. The average value of BMI of the students was 22.5 ± 7.0 kg/m². In accordance to the WHO criteria, participants were classified based on their BMI as underweight (BMI < 18.5), normal (BMI = 18.5–24.9), overweight (BMI = 25–29.9) or obese (BMI ≥ 30). The majority of students were of normal weight (about 52.7% with a range of 21.0 ± 1.8 kg/m²), while the overweight students represented 23.1% with a range of 16.5 ± 3.0 kg/m² and contributed to the study sample with almost the same percentage as those categorized as either overweight or obese where 14.8% of the participated students were overweight with a range of 27.2 ± 1.5 kg/m² while only 9.5% of them were obese with a range of 37.9 ± 10.6 kg/m². The prevalence of overweight and obesity in our study is comparatively lower than what has been reported in other Arabian Gulf countries such as Oman (28.2%) (Al-Kilani, Walw, & Yousef, 2012), Kuwait (28.4%) (Papandreou, Noor, Rashed, & Al Jaberi, 2015), Saudi Arabia (37.5%) (Al-Rethaiaa, Fahmy, & Al-Shwayiat, 2010) and the United Arab Emirates (35.7%) (Musaiger, Lloyd, Al-Neyadi, & Bener, 2003). As for the distribution of students by college, the highest three participations came from students in the Colleges of Science (39.9%), Information Technology (19.5%) and Engineering (14.2%), while the least participation came from the College of Physical Education (Table 1).

3.2. Emotional food intake

The similarity and the differences among the eight emotions of concern with respect to their effect on students’ food intake are represented graphically (Figure 1) and summarized statistically in terms of the first quartile, the median and the third quartile (Table 2). It is apparent that almost all students in the study sample tend to consume much less food than usual when they feel afraid. It has been also found that under other strong negative emotions such as sadness, anger, stress and depression, the majority of the surveyed students tend to reduce their food intake. The exception was loneliness, which, in addition to happiness, students tend to sustain their food intake without alteration (45.6% and 55.0%, respectively). This is in line with some previous studies, showing decreased eating during negative emotions in non-obese individuals.
However, for the latter two emotions (i.e. loneliness and happiness), a noticeable percentage (32.0% and 39.6%, respectively) of students tend to increase their food intake. This corresponds with previous research which has shown that positive emotions increase food intake among healthy US college students with a normal weight (Evers, Adriaanse, de Ridder, & de Witt Huberts, 2013). Further, it is interesting to note that in the case of boredom students tend to increase their food intake regardless of their body weight. These findings are consistent with those of Moynihan et al. (2015), who reported that boredom was predictive of energy-dense food consumption among students at an Irish university. Moreover, our results also support Koball, Meers, Storfer-Isser, Domoff, and Musher-Eizenman (2012) in that undergraduate students in the boredom condition eat more in comparison to other negative emotion states.

In order to assess the aforementioned realizations statistically, Friedman test as an overall test for repeated measures was used. The test showed that the considered emotions have significantly different effect on food intake (test statistic = 360.510 and p-value < 0.001). Accordingly, Wilcoxon Signed-Rank test as a post-hoc test was used for the pairwise within-subject comparisons. The corresponding results revealed that the students’ food intake was not significantly different in the cases of fear, sadness, anger, stress and depression as shown in Table 3. Therefore, it can be concluded that strong negative emotions have similar effect on the students’ food intake. Interestingly, these findings partially cohere with Evers, Dingemans, Junghans, and Boevé (2018) recent meta-analysis which showed that, in general, negative emotions did not cause any changes in eating behavior. On the other hand, the similarity in the effect of happiness and loneliness on the students’ food intake was not statistically significant.

As far as the students’ demographic characteristics are concerned, Mann-Whitney test (Tables 4 and 5) indicated no significant differences between male and female students, as well as between single and married students, when they are compared with respect to their food intake under each emotional state.

On the other hand, Kruskall-Wallis test revealed no significant differences among the BMI categories regarding food intake for all emotions except for boredom (Table 6). Accordingly, under boredom, Mann-Whitney test as a post-hoc test for pairwise comparisons was implemented (Table 7). The reported results indicate that underweight students seem to behave significantly different than those with normal weight or overweight regarding their food intake. As shown in Figure 2 and Table 8, the majority of students tend to increase their food intake when they are bored. This tendency to overeat in response to boredom was previously reported among US college students, which may be the result of poor time management skills (Bennett et al., 2013). The increased food intake in response to the negative state of boredom could

![Figure 1. Barplots of UOB students’ food intake as a response to different emotions.](image-url)

![Table 2. First quartile (Q1), median (Q2) and third quartile (Q3) for UOB students’ food intake under each emotion.](table-url)
be the result of the participants’ motivation to look for more meaningful activities in order to escape monotony (Havermans, Vancleef, Kalamatianos, & Nederkoorn, 2015). On the other hand, there was a clear tendency by underweight students to either reduce their food intake or sustain it to the usual level when feeling bored. This finding supports the work of Geliebter and Aversa (2003) who found that the tendency for underweight individuals to eat less when experiencing negative emotions may contribute to their low body weight.

### 3.3. Emotional food choice

To assess the effect of different emotions on food choice, the students were asked to select among four types of foods that have been specified according to calorie content and taste. It is worth mentioning that there was a noticeable percentage of “None” answers for each emotional state in which students gave several alternative food types, which

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**Table 3.** The results of Wilcoxon signed-rank test (p-value) for pairwise within-subject comparisons.  

| Emotion       | Boredom | Happiness | Loneliness | Sadness | Anger | Stress | Depression |
|---------------|---------|-----------|------------|---------|-------|--------|------------|
| Fear          | 296 (<0.001) | 422 (<0.001) | 561 (<0.001) | 516 (<0.001) | 648 (<0.001) | 468 (<0.001) | 407 (<0.001) |
| Boredom       | 2933 (0.047) | 3207 (<0.001) | 8094 (<0.001) | 7026 (<0.001) | 5847 (<0.001) | 7218 (<0.001) | 7420 (<0.001) |
| Happiness     | 3562 (<0.001) | 7408 (<0.001) | 7887 (<0.001) | 6754 (<0.001) | 8203 (<0.001) | 8203 (<0.001) | 8203 (<0.001) |
| Loneliness    | 5457 (<0.001) | 5162 (<0.001) | 4072 (<0.001) | 5441 (<0.001) | 4072 (<0.001) | 5441 (<0.001) | 5441 (<0.001) |
| Sadness       | 1614 (0.538) | 1270 (0.115) | 1106 (1.000) | 1106 (1.000) | 1106 (1.000) | 1106 (1.000) | 1106 (1.000) |
| Anger         | 1598 (0.495) | 1770 (0.449) | 1442 (0.606) | 1442 (0.606) | 1442 (0.606) | 1442 (0.606) | 1442 (0.606) |
| Stress        | 1873 (0.138) | 1873 (0.138) | 1873 (0.138) | 1873 (0.138) | 1873 (0.138) | 1873 (0.138) | 1873 (0.138) |

The significance level is 0.05/28 ≈ 0.002 after accounting for multiple testing using Bonferroni correction.  

**Table 4.** The results of Mann-Whitney test (p-value) for pairwise between male and female students.  

| Emotion       | Fear      | Boredom   | Happiness | Loneliness | Sadness | Anger | Stress | Depression |
|---------------|-----------|-----------|-----------|------------|---------|-------|--------|------------|
| Gender        | 1699 (0.016) | 2437 (0.169) | 2049 (0.679) | 2397 (0.261) | 1976 (0.446) | 2000 (0.529) | 1745 (0.072) | 1848 (0.179) |

The significance level is 0.05/8 = 0.006 after accounting for multiple testing using Bonferroni correction.

**Table 5.** The results of Mann-Whitney test (p-value) for pairwise between single and married students.  

| Emotion       | Fear      | Boredom   | Happiness | Loneliness | Sadness | Anger | Stress | Depression |
|---------------|-----------|-----------|-----------|------------|---------|-------|--------|------------|
| Marital status| 1673 (0.684) | 1797 (0.774) | 1793 (0.788) | 1735 (0.983) | 1805 (0.738) | 1231 (0.010) | 1757 (0.933) | 1566 (0.374) |

The significance level is 0.05/8 = 0.006 after accounting for multiple testing using Bonferroni correction.

**Table 6.** The results of Kruskall-Wallis test (p-value) for overall between-subject comparisons with respect to BMI.  

| Emotion       | Fear      | Boredom   | Happiness | Loneliness | Sadness | Anger | Stress | Depression |
|---------------|-----------|-----------|-----------|------------|---------|-------|--------|------------|
| Marital status| 0.984 (0.805) | 13.200 (0.004) | 1.540 (0.673) | 2.654 (0.448) | 4.554 (0.208) | 5.969 (0.113) | 2.998 (0.392) | 4.480 (0.214) |

The significance level is 0.05/8 = 0.006 after accounting for multiple testing using Bonferroni correction.

**Table 7.** The results of Mann-Whitney test (p-value) for pairwise between-subject comparisons under boredom.  

| Underweight vs normal | Underweight vs overweight | Underweight vs obese | Normal vs overweight | Normal vs obese | Overweight vs obese |
|-----------------------|---------------------------|----------------------|---------------------|-----------------|--------------------|
| 1262 (0.006) | 282 (0.002) | 238 (0.139) | 893 (0.074) | 740 (0.781) | 247 (0.122) |

The significance level is 0.05/6 = 0.008 after accounting for multiple testing using Bonferroni correction.
made it difficult to categorize them in one of the four options of concern. For this reason, all subjects with “None” answers have been excluded from the analysis of emotional food choice. The latter action resulted in a reduction of the sample size to 57 subjects. The corresponding results extracted from this reduced sample are summarized graphically in Figure 3. It is apparent from the figure that the least preferable choice among the four options was the low-calorie salty food regardless of the emotional state. Interestingly, for the five strong negative emotions (i.e. fear, sadness, stress, depression and anger) as well as for happiness, the first preferable choice was the high-calorie sweet food. This is in line with previous studies that have demonstrated an overall increase in the consumption of highly caloric sweet foods among university students who experience negative emotions (Habhab, Sheldon, & Loeb, 2009; Kandiah, Yake, Jones, & Meyer, 2006; Mikolajczyk, El Ansari, & Maxwell, 2009). Research has shown that the preference for calorie-dense foods with high carbohydrate content is associated with their being viewed as highly palatable. Indeed, these so called “comfort foods” can provide short term pleasure and relief from discomfort (Dallman, Pecoraro, & la Fleur, 2005). Moreover, these highly palatable energy-dense foods are available on campus and surrounding food outlets and could potentially serve as a meal replacer, suggesting that obtaining a rapid source of energy may be important when experiencing high stress (Errisuriz, Pasch, & Perry, 2016). Convenience, together with palatability and availability, were main determinants of food choice motivation among college students (Pearcey & Zhan, 2018; Yahia, Achkar, Abdallah, & Rizk, 2008). A further finding in this study was that both females and males indicated preference for energy-dense foods typically high in salt in response to emotions like boredom and loneliness. Silliman, Rodas-Fortier, and Neyman (2004) reported boredom as the most frequent reason for snacking among US college students. According to their study, however, males were more likely to snack on high-calorie savory foods, whereas females preferred snacking on sweet foods. Nevertheless, due to the small sample size in our analysis, these realizations need further research to be confirmed and generalized.

3.4. Emotional perception

The results obtained regarding the students’ perceptions towards emotional eating are summarized in Table 9. It was found that slightly more than half of the students (56.2%) described themselves as emotional eaters, with a quarter of them reported experiencing such behavior at university. This finding is in agreement to that of Lopez-Minguez, Gomez-Abellán, and Garaulet (2016) who found that 60% of the study population were emotional eaters. However, the majority (71.6%) of the students in the study sample did not feel guilty from such behavior. This contradicts existing research that suggests that emotional eating frequently results in a sensation of uncomfortable fullness followed by feelings of guilt and self-disgust, which may contribute to increase in body weight (Bennett et al., 2013; Costarelli & Patsai, 2012). Furthermore, 61.5% of the students were not bothered by emotional eating and did not want to change their behavior. This corresponds with previous work, which found that the majority of college students from a Northeastern US university, were not bothered by their emotional eating (Bennett et al., 2013). Unlike the study by Bennett and coworkers, the participants in this study did not suggest solutions to reduce emotional eating. Furthermore, it has been suggested that self-perceived emotional eating may not be an accurate description of participants’ actual tendency to eat in response to negative

Figure 3. Food choice for each emotional state among UOB students.
This may perhaps be the reason why most participants in this study felt less guilty about emotional eating, with nearly half of them (48.5%) unaware of when they first noticed such behavior. Therefore, there is a need for future research investigations that aim to discuss in more depth how students manage emotional eating.

### 3.5. Limitations

The current study has several limitations. The study is limited by its cross-sectional design, using a small sample of students from one university, which may not be representative of all college students in Bahrain. Another potential limitation of this study was the use of self-reported values of height and weight to estimate the BMI of college students as well as self-report measures of emotional eating which are subject to bias. However, we feel confident that the use of a validated self-report instrument, which is widely used in the literature, provided us with a reliable data from our students. Finally, the dietary choices offered to the students did not include alternative foods (i.e. local foods), which made it difficult to sort them in one of the four main food categories. However, items were chosen to represent foods that are readily available to college students on campus, and thus relevant to the current cohort of young adults.

### 4. Conclusions

In conclusion, the present study indicated that a large proportion of students experiencing negative emotional states tend to eat less and that they overeat in response to positive emotions. Boredom was cited as a contributing factor to emotional eating behavior resulting in the consumption of high-calorie sweet and high-calorie savory foods. Given that many aspects of university life have the potential to cause stress, the results support previous findings that suggest that time and stress management skills may be an important component in addressing emotional eating behavior among college students. Moreover, intervention programs that effectively target changes to the university food environment should be implemented to promote healthy eating behaviours and reduce the incidence of overweight and obesity in our society.

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### Disclosure statement

None declared.

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