Original Article

The Relation between Emotional Eating and Perceived Stress among Students in Tertiary Education in Oman: A Single-Center Study

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Abstract

Objectives: Preliminary studies suggested that the high rates of stress are increasingly prevalent in students in tertiary education in the Arabian Gulf countries and that their emotional eating is often triggered by stress. Nevertheless, there is a dearth of studies on this topic and Oman is no exception. In this study, we intended to examine the prevalence of emotional eating and perceived stress in Omani college students and to clarify the relationship between their emotional eating and sociodemographic and risk factors among the population in the college students in Oman. **Methods:** We used Salzburg Emotional Eating Scale and Perceived Stress Scale to assess emotional eating and variations in perceived stress, respectively. We also study their sociodemographic and risk factors. **Results:** A total of 422 students took part in the study, with the age of 20.6 ± 1.8 (mean ± standard deviation) years. Of all students, 85.8% (n = 362) were reported to have emotional eating and 78.7% of the sample were reported to experience stress. The multivariate logistic analysis showed that body mass index (BMI) and the student's major subjects were the significant risk factors. Students who majored in science/engineering/agriculture (odds ratio [OR] = 0.926, $p < 0.001$) and arts/business/law were 3.1 times (OR = 3.115, $p < 0.05$) and 2.3 times (OR = 2.347, $p < 0.05$) were significantly engaged in emotional eating as compared to those majoring in medicine/nursing. Students who are underweight (BMI < 18) were 3.9 times (OR = 3.984, $p < 0.05$) were also significantly more to engage in emotional eating than those students who were overweight/obese (BMI 25+). **Conclusion:** In this study, we found that both rates of emotional eating and stress were high among college students in Oman. Contrary to international trends, underweight students (BMI < 18) were more prone to engaging in emotional eating than overweight/obese students (BMI 25+) in our study sample. This suggests that there is likely to be subcultural diversity or artifacts that are intimately tied to emotional eating. More studies on this discrepant finding are warranted.

Key words: anthropomorphic factors, college students, Perceived Stress Scale, Salzburg Emotional Eating Scale
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Introduction

Worldwide, young adults in college students have been reported to experience elevated rates of stress, having disproportionally high rates of poor coping mechanisms compared to those in the general population [1, 2]. The "Canadian Campus Survey" [3] has been reported the prevalence of perceived stress among Canadian college students to be 30%. Similar figures were reported in Egyptian (30.9%), Saudi (28.9%) [4], and Malaysian college students (37.7%) [5]. Higher rates were, instead, revealed in India (42.5%) [6] and Pakistan (58.9%) [7]. While stress-related

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afflictive presentations such as anxiety and depression have widely been explored among such strata of the population [8, 9], the evidence also suggests that other less studied presentations such as disordered eating (DE) are pervasive in college students [10].

DE is defined as a troublesome, nonnormative eating pattern that can include food restriction, purgative practices, bingeing, and other nonsocially sanctioned methods to control food intake [11]. This eating style characterizes several eating-related psychopathologies in the category of ED, albeit with less frequency/intensity and while not all DE evolves into full-blown ED diagnoses, it can lead to remarkable health and psychosocial complications [12]. Therefore, DE deserves adequate attention [11].

DE has been initially thought to be part of culture-bound syndromes [13] relegated to young, Western females residing in high-income countries, such as those in North America and Western Europe. However, recent data suggest that a significant portion of the global burden of these presentations is shouldered by multiple countries outside of the aforementioned socio-economic context [14] and regions [15, 16]. Putative contributors to DE include genetics, personality traits such as perfectionism, and temperament that manifest as obsessiveness. Studies also suggested that socio-cultural patterns, environmental influences, and psychological factors have been strongly implicated in the cause and maintenance of DE [17]. Indeed, concurrent emotional distress has been widely reported in people with DE [18, 19].

DE whether due to deliberate food restriction or conversely overeating is increasingly recognized to be a serious public health and constitutes a global leading cause of preventable diseases, poor quality of life, morbidity, and fatality [20]. Studies are therefore warranted to explore the antecedents of DE so that such precipitating factors can be used in the algorism for potential presentation and treatments. One antecedent to DE that has received attention in the literature is the concept of emotional eating [21], a maladaptive compensatory strategy to relieve and cope with negative affect. Emotional eating is characterized by the rapid ingestion of large quantities of food and feeling of fullness, a feat that echoes binge eating [22]. To act as symptom substitution or using sociological parlance, "self-medication" [23], but it can lead to a myriad of ill effects [12].

While the concept of ED has received a plethora of studies in Western populations [24], there is a dearth of studies in nonwestern countries and Arabian Gulf countries (AGC) are no exception. Studies from the non-Western population have the potential to shed light on whether emotional eating is not simply a cultural artifact. AGC like Oman provide an interesting platform to explore emotional eating and its trajectories. As DE tends to predominately affect the young population [25], the Arabian Gulf has a predominant youth bulge on its population structure. For example, Oman fulfills the criteria of being in the midst of the second phase of demography [26]. With the increased higher education in Oman [27], the high prevalence of DE has been documented in college students elsewhere [10, 28], it remains to be established whether Oman's young population is also prone to emotional eating.

As the evidence is still nascent [29, 30], it remains to be seen whether food craving and perceived food intake as a function of trait stress-eating exist in cross-cultural samples [31]. To fill the gap in the literature, we intended to examine the prevalence of emotional eating and perceived stress in college students as well as to study the relationship between emotional eating and sociodemographic factors among these strata of the population.

Methods

Study setting, recruitment criteria, and study participants

In this descriptive cross-sectional study, we intended to recruit undergraduate students at Sultan Qaboos University (SQU) in Muscat, the nation's capital. To date, SQU remains the national university with students from the various regions of the country as it constitutes the only public institution under the auspicious of the ministry of higher education of higher learning. The requirement for entering SQU is the performance in the school-graduating examinations. SQU has been internationally lauded to be one of the rare institutions of learning where the student body equals both genders, with a total number of 15,000 students distributed in nine different colleges (see the website at SQU at www.squ.edu.om/Academics/Colleges). As per the regulation of conducting studies among students at SQU, the study survey was forwarded to the specific office where they were then relayed to specific colleges. The tutors dispensed the study survey to the student during the lecture.

Inclusion criteria consisted of Arabic speakers and undergraduate students attending both science, medical, and arts colleges. Exclusion criteria from the study included the presence of a protracted and refractory medical or psychological condition.

In this study, we adhered to the American Association for Public Opinion Research (AAPOR) reporting guidelines at www.aapor.org/Publications-Media/AAPOR-Journals/Standard-Definitions.aspx). Before starting the study, the Medical Research Ethics Committee at the College of Medicine and Health Sciences approved the study protocol (case number = MREC# 1740 and date of approval = August 29, 2018) with the need of obtaining written consent from the study participants. The survey was anonymous, and the confidentiality of information was assured.

Sample size calculation

The calculated sample size was 375 by taking the level of confidence as 95% and the margin of error as 5% [22]. Out of 700 forms distributed, 619 forms were filled with a response rate of 88.4%. A sum of 197 forms out of the 619 was discarded as they were missing important information such as height, weight, or emotional eating scale, and 422 forms were completed. The data were collected from October 1 to November 30, 2018.

Outcome measures

Students who consented to participate were asked to fill in this study survey that consisted of three parts. The first part consisted of demographic information, anthropomorphic measures, and smoking habits. The present breakdowns of body mass index (BMI) were 18.5 = underweight; 18.5–24.9 = normal weight; 25.0–29.9 = overweight; and 30.0–34.9 = obesity. In addition to sociodemographic data and risk factors, the consenting participants were requested to complete the following measuring instruments:

Salzburg Emotional Eating Scale

After permission was granted by the progenitor of the scale [32], we used the SEES to measure emotional eating. The Salzburg Emotional Eating Scale (SEES) is a 20-item self-reported questionnaire, measuring changes in eating behavior in response to various emotional states, with responses such as "I eat much less than usual" to "I eat much more than usual" scored from 1 to 5. This SEES is scored as follows: yes < 3 changes in eating behavior, no changes in eating behavior ≥ 3. Higher scores indicate the presence of emotional eating. To date, the SEES has not been subjected to cross-cultural validation [33]. For the present purpose, the Arabic version of the SEES was used, translated into the Arabic-Omani dialect using the protocol for back translations [34]. The internal validity was found to be adequate (Cronbach's alpha ≥ 0.820).

Perceived Stress Scale

The Perceived Stress Scale (PSS) is a widely-used 10-item tool, measuring the degree of an individual's perception of stressful situations [35]. Ten statements exist on the PSS designed to assess levels of stress experienced in the last month. The statements are scored on a scale from 0 to 4, with 0 indicating "never" and 4 being "very often" type of responses to the statements. PSS has been extensively used in many linguistic and ethnic groups and its cross-cultural adaptability has been reported to be adequate [36, 37]. A cut-off ≥ 14 differentiates those with perceived stress or otherwise. To date, no publicly available Arabic version of PSS exists [38]. Hence, this study used a back translation protocol to convert the PSS into the Omani dialect. The translated version appears to have heuristic values as Cronbach's alpha is within the required range (Cronbach's alpha = 0.740).

Statistical analysis

Descriptive analysis of the categorized variables was presented in proportions (e.g., the prevalence of emotional eating), and continuous variables were presented as the mean and standard deviation. To identify the contributing variables associated with variation of emotional eating, univariate analysis was used. We evaluated demographic, BMI, smoking status, and perceived stress with the Chi-square, Fisher's exact test, and *t*-test to explore the association between subtypes of emotional eating. A logistic regression model (enter method) was also used: emotional eating subtypes were the dependent variable. The univariate analysis' variables were incorporated in the model as independent variables and adjusted simultaneously.

The collected study data were analyzed using International Business Machine Statistical Package for the Social Science (SPSS) software version 23 for Windows (IBM Corp, Armonk, New York, USA). The differences between the groups were considered significant if *p*-values were smaller than 0.05.

Results

Table 1 presents the results of the sample composition in demographic factors, emotional eating, and stress level. A total of 422 students took part in the study: 85.8% (n = 362) fulfilled the criteria for emotional eating, while 14.2% (n = 60) scored below the threshold for emotional eating. Perceived stress was reported by 78.7% of the sample using the cutoff being equal or > 14.

The sample comprised more females (59.1%) than males (40.9%) and the average age ± standard deviation was 20.6 ± 1.8 years. About 83% (n = 351) of the sample lived outside the family home. Almost 35% of the participants (n = 147) were enrolled in sciences/engineering/agriculture fields, 30% (n = 126) studied arts/business/law, 21% education,

Table 1. Basic demographic, emotional eating, and stress levels of students (N = 422)

Demographic	*n* (%)
Gender	
Female	254 (60.2)
Male	168 (39.8)
College	
Science/Engineering/Agriculture	147 (34.8)
Education	89 (21.1)
Arts/Business/Law	126 (29.9)
Medicine/Nursing	60 (14.2)
Living	
Outside	351 (83.2)
Family	71 (16.8)
Age (years), mean±SD	20.6 ± 1.8
BMI	
Underweight, < 18	60 (14.2)
Normal, 18-25	268 (63.5)
Overweight/obese, 25 +	94 (22.3)
Years of study	
1-2	133 (31.5)
3-4	163 (38.6)
5 +	126 (29.9)
Smoking	
Yes	7 (1.7)
No	415 (98.3)
SEES, emotional eating	
Yes	362 (85.8)
No	60 (14.2)
PSS - stress	
Yes	332 (78.7)
No	90 (21.3)

SEES (yes < 3 changes in eating behavior, no changes in eating behavior ≥ 3); PSS (yes ≥ 14, no ≤ 13.
BMI, body mass index; SEES, Salzburg Emotional Eating Scale; PSS, Perceived Stress Scale; SD, standard deviation

Table 2. Univariate and multivariate (logistic) regression analysis on emotional eating for students in association with demographic factors and stress levels

Demographic/stress	SEES - eats less		Univariate OR	Multivariate OR
	Yes (n = 362; 85.8), n (%)	No (n = 60; 14.2), n (%)		
Gender				
Female	214 (59.1)	40 (66.7)	0.723	0.914
Male (reference)	148 (40.9)	20 (33.3)		
College				
Science/Engineering/Agriculture	133 (36.7)	14 (23.3)	3.167**	3.115*
Education	75 (20.7)	14 (23.3)	1.786	1.608
Arts/Business/Law	109 (30.1)	17 (28.3)	2.137	2.347*
Medicine/Nursing (reference)	45 (12.4)	15 (25.0)		
Living				
Outside	302 (83.4)	49 (81.7)	1.130	1.254
Family (reference)	60 (16.6)	11 (18.3)		
Age (years), mean±SD	20.5±1.7	21.0±2.1	1.013	1.136
BMI				
Underweight < 18	56 (15.5)	4 (6.7)	4.547*	3.984*
Normal 18-25	231 (63.8)	37 (61.7)	1.582	1.672
Overweight/obese 25 + (reference)	75 (20.7)	19 (31.7)		
Year of study				
1-2	118 (32.6)	15 (25.0)	1.757	0.792
3-4	141 (39.0)	22 (36.7)	1.431	0.984
5 + (reference)	103 (28.5)	23 (38.3)		
Smoking				
Yes	6 (1.7)	1 (1.7)	0.994	1.523
No (reference)	356 (98.3)	59 (98.3)		
PSS - stress				
Yes	281 (77.6)	51 (85.0)	0.612	0.519
No (reference)	81 (22.4)	9 (15.0)		

*p < 0.05; **p < 0.01, significantly different using the Chi-square test or Fisher's exact test when appropriate.
SEES (yes < 3 eats less, no ≥ 3); PSS (yes < 14, no ≥ 13. Hosmer and Lemeshow Test, χ^2 = 6.582, p = 0.582; sensitivity=58.3%, specificity = 55.0%, overall predicting. Power = 57.8%.
BMI, body mass index; SEES, Salzburg Emotional Eating Scale; PSS, Perceived Stress Scale; SD, standard deviation; OR, odds ratio

and the rest were medicine/nursing students. More than 38% (n = 163) were from years 3 to 4, followed by the year 1–2 (31%) and then senior students (year 5 +). The majority of the participants (63.5%, n = 268) had a normal BMI (19–25), 22% were overweight/obese (BMI 25 +), and the rest were underweight (BMI <18). More than 78% (n = 332) reported stress symptoms. Only a small percentage were smokers (n = 7, 1.7%).

Table 2 presents the univariate (unadjusted) and multivariate (adjusted) logistic regression analyses. The multivariate logistic analysis showed that BMI and the majoring subjects of study were significant risk factors for the development of emotional eating. According to the Hosmer–Lemeshow goodness-of-fit test (χ^2 = 6.582, p = 0.582), with a post-adjustment moderate predicting power of 57.8% (sensitivity = 58.3% and specificity = 55.0%). Students majoring in science/engineering/agriculture students and arts/business/law were 3.1 times (odds ratio [OR] = 3.115, p < 0.05) and 2.3 times (OR = 2.347, p < 0.05), respectively, significantly more engaged in emotional eating compared to those majoring in medicine/nursing. Underweight students (BMI < 18) were 3.9 times (OR = 3.984 p < 0.05) significantly more engaged in emotional eating compared to overweight/obese students (BMI 25 +).

Discussion

To date, this is the first study to examine the prevalence of emotional eating among college students in Oman. Emotional eating has been postulated to be an important precursor for the development of DE [21] and has the potential to impact the physical, emotional, and social well-being of those in the college education. Previous studies have suggested that the prevalence of DE and obesity has remarkably increased in the past decades (see AAPOR reporting guideline at www.aapor.org/Publications-Media/AAPOR-Journals/Standard-Definitions.aspx) [39, 40]. Emotional eating, despite being an antecedent, has received scant attention.

This study recruited 422 participants. The majority of the participants were female, and this is likely to reflect the recent increase in the percentage of women accessing higher education [41] in Oman, a trend also reported in other parts of the world. The majority of the participants were students

of science/engineering/agriculture colleges, as well as arts/business/law colleges. This is likely to reflect the fact that these colleges have the highest student enrollments. The majority of the participants lived outside their family homes, an understandable trend given that SQU is the only national university and that it draws students from different parts of Oman. In risk factors, 22% of the participants were obese and 14% were underweight (Table 1). The majority were non-smokers.

About 86% of the total sample engaged in emotional eating (decreased food intake) as measured by the SEES. This figure is much higher than 56.2% reported by Alalwan et al. [42] in Bahraini students and 47.2% reported by Al-Musharaf [43] in Saudi women, although a direct comparison between the studies is limited due to the use of different scales and different approaches to measuring emotional eating. Furthermore, the Omani rates were to be exceptionally higher than the 10% reported by Sze et al. [44] in college students in Hong Kong. As mentioned, robust comparisons between different countries are hampered by the fact that different approaches for soliciting the presence of emotional eating are used. Despite such a caveat, it was that emotional eating is higher in Omani students compared to students in other countries. Explanations for such high rates could be due to the significant rapid urbanization that Oman experienced in the past 40 years. Fast-paced urbanization has often been associated with an increase in DE [45].

A source of perplexity across the studies is the increased tendency for emotional eating. Globally, about 40%–50% of the population consumes more food in response to being afflicted by negative emotions [46, 47]. Recent evidence shows that negative emotions tend to trigger eating energy-dense sweet snacks whereas positive emotions prompt healthier options [5, 48, 49]. A study conducted by Wilson et al. [50] reported that about one-third of college students are more likely to eat in response to perceived stress. Instead, some of the evidence from the Arab world suggest that college students in the region tend to eat less under stress. The previously mentioned study by Alalwan et al. [42] conducted on university students in Bahrain indicated that the majority of the sample report eating less when faced with high levels of stress. A similar trend was also shown in a study on Egyptian students [51] and African-Americans [52]. This view is consistent with the present research data, where the majority of participants reported eating less when stressed (85.8%).

While both non-normative under/overeating as a result of stress fit in with the notion that emotional eating is influenced by stress [49, 52-54], these contrasting trends deserve further attention. Even recent regional studies have reported an increase in food consumption among Saudi undergraduates when under stress [55], suggesting that even within the same region, the reaction of the individuals trends can be in opposite directions. Previous research implied that the relationship between afflictive emotions and emotional eating depends on both the sociodemographic and risk factors associated with decreased or increased emotional eating [51]. Therefore, more studies on this endeavor are warranted.

The final objective of this study was intended to find which sociodemographic variables (gender, place of study, place of residence, age, and years of study) and risk factors (BMI, smoking, and PSS) play part in the expression of emotional eating.

First, the results of multivariate logistic analysis (Table 2) showed that BMI was a significant risk factor for emotional eating ($p < 0.05$). This finding suggests that individuals who have a BMI under 18 and are therefore classified as underweight were significantly more to eat less when harboring negative emotions. This differs from previous evidence that reported bingeing as a result of afflictive emotions [53, 56, 57]. In support of such a view, the present data suggest that underweight students (BMI < 18) are more likely to engage in emotional eating compared to those with a higher BMI. If the present finding is indeed different from that of previous studies, some sociocultural factors might play a role in emotional eating. In a traditional Omani society, many social occasions are celebrated with feasts, and this implies that food might be equated with joy and festivities. On the other hand, adverse emotions are likely to dampen enthusiasms to eat. This view is consistent with the present data. More research on such cross-cultural aspects is therefore warranted to strengthen this finding.

Second, students majoring in science/ engineering/ agriculture/arts/business and law were more likely to endorse high emotional eating compared to those majoring in medicine/nursing. This may seem counter-intuitive since the plethora of studies alludes to the higher rates of stress reported in the medical profession - medical students and nurses - compared to those in the general population [58]. On the one hand, it is possible that working in a constant high-stress environment would prompt medical trainees to develop other coping strategies rather than food. It is also possible that medical students and nurses are more aware of the adverse effects of over-eating or under-eating compared to those majoring in other subjects. On the other hand, DE is common in medical students. For example, a systematic review and meta-analysis by Jahrami et al. [59] suggested that the overall pooled prevalence of eating disorders was 10.4% with a prevalence that ranged from 2.2% to 29.1%. It remains to be seen whether emotional eating solicited by the present instrument SEES is one of the antecedents for pathological eating. More studies, therefore, are obviously needed.

Study limitations

The readers are warned not to over-explain the study results because this sort of study has various limitations. Five most obvious limitations are only highlighted here:

- This is a cross-sectional study. Therefore, much-needed evidence of "cause and effect" remains important confounders from this study.
- The tools used in the study were back-translated into Arabic with adequate internal validity (Cronbach's alpha). However, the psychometric properties of these measures need to be established.

- Some of these tools such as emotional eating and PSS are developed to assess one's ability to introspect or have a sufficient level of "psychological mindedness" [60].
- In Eastern societies such as those in Oman, sociocultural teachings, the idiom of distress is often framed as somatic distress rather than psychological distress as intimately tied with emotional eating and stress [61].
- This study is based only on a single institution. The representation of data for the whole nation Oman is doubtful. Future studies should be expanded to include the national representative of the students in the higher institution of learning at the national level.

Summary

To date, many instruments have been used to solicit the presence of emotional eating. The present study has used Salzburg Emotional Eating and PSS to assess emotional eating and perceived stress, respectively. The prevalence of emotional eating was 85.8% while perceived stress was 78.7%. The present rate is in the upper range of global figures. For theoretical interest, the related objectives of this study were to study the relationship between emotional eating and sociodemographic factors. BMI, being nonmedical, and nonnursing college students emerged to be significant in the multivariate logistic analysis in this study. The most salient part of the present study is that being underweight was strongly related to emotional eating, a feast has some supporting as well as dissenting views in the literature. Emotional eating and its precedent are likely to fluctuate in a complex way and cultural and socio-demographic factors play critical roles. More studies are therefore warranted.

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Conflicts of Interest

The author declares no conflicts of interest in writing this report.

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