



Food Consumption Frequency, Perceived Stress, and Depressive Symptoms Among Female University Students in Dubai, United Arab Emirates

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OPEN ACCESS

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Specialty section:

This article was submitted to
Nutrition and Sustainable Diets,
a section of the journal
Frontiers in Sustainable Food Systems

Received: 10 October 2021

Accepted: 07 February 2022

Published: 18 March 2022

Citation:

Mohamad O, Al Sabbah H, Smail L,
Hermena EW and Al Ghali R (2022)
Food Consumption Frequency,
Perceived Stress, and Depressive
Symptoms Among Female University
Students in Dubai, United Arab
Emirates.
Front. Sustain. Food Syst. 6:792631.
doi: 10.3389/fsufs.2022.792631

Background: This study assessed whether perceived stress and depressive symptoms were associated with the frequency of consumption of specific food groups among female university students.

Methods: A cross-sectional study was conducted among female university students using a simple random sampling method. The response rate was 97%, with a total number of 385 participants. The associations between stress levels and most/least-consumed food groups, and between depressive symptoms levels and most/least-consumed food groups were assessed. The questionnaire included a 12-item self-administered food frequency questionnaire, Cohen's Perceived Stress Scale, and the Beck Depression Inventory-II. The study was approved by the University Ethical Committee prior to the data collection. One-way Analysis of Variance (ANOVA) and an independent-sample *t*-test were performed to test the equality of population means across the categories of each independent variable depending on the number of categories of the independent variable.

Results: Overall, this group of female university students fell under the mild mood disturbance category (depressive symptoms) (BDI-II) and had moderate perceived stress (PSS). Perceived stress was associated with more frequent consumption of salad/raw vegetables and cooked vegetables and less frequent consumption of cake/cookies and meat/sausage products ($p < 0.05$). Additionally, depressive symptoms were associated with less frequent consumption of fresh fruits and increased consumption of fast food/canned food and soft drinks ($p < 0.05$).

Conclusions: The data showed that stress and depression were associated with different dietary preferences, which is consistent with the distinctions between stress and depression in human behavior. Specifically, the results revealed associations between soft drinks consumption and higher depressive symptoms and between frequent consumption of salad/raw vegetables and cooked vegetables and higher perceived stress among this group of female university students.

Keywords: perceived stress, depressive symptoms, university students, dietary behavior, mental health

INTRODUCTION

Stress and depression can result in a number of complications, including maladaptive eating behaviors such as overeating or undereating (Oliver et al., 2000; Kramlinger, 2001). These inconsistencies in dietary habits can be caused by stress and other factors, resulting in weight gain or loss in individuals with stress or depression. These changes in eating habits may eventually lead to changes in lifestyle behaviors (Schmidt, 2012). Additionally, undergoing stressful life situations could be a risk factor for developing depression (Kramlinger, 2001).

Over the past few years, the relationship between the type and the frequency of dietary intake has been studied in relation to mental health. This growing field of study concluded that higher consumption of processed and Western food indicates a higher risk of developing poor mental health (Rucklidge and Kaplan, 2016). Prospective studies have relied on causality to explain the nature of this relationship; unhealthy diets at baseline showed a higher risk of depression and poor mental health, whereas healthier diets at baseline showed better mental health and a lower risk of depression (Akbaraly et al., 2009; Jacka et al., 2011; Sánchez-Villegas et al., 2012). In experimental studies, when participants were exposed to a stressful situation, they tended to consume more of high-density foods and sweets (Oliver et al., 2000; Zellner et al., 2006). In addition, cross-sectional studies have suggested that higher perceived stress is positively associated with higher intake of fat, sodium, and carbohydrates (Nastaskin and Fiocco, 2015; Dehghan et al., 2016). However, other studies found that higher levels of stress were not associated with more sweets consumption but it was associated with lower fruit and vegetables intake (El Ansari and Berg-Beckhoff, 2015).

Moreover, systematic reviews have shown that foods rich in antidepressant nutrients, such as folate, iron, and chain omega-3 fatty acids (EPA and DHA), can enhance a person's mental health, and that people who consume these foods more often are less likely to develop depression (LaChance and Ramsey, 2018). The biological link between healthy diets and better mental health can be explained by several factors, including the neurotransmitter precursors, inositol and tryptophan (Grases et al., 2019). People with a higher depression score reported a lower consumption of legumes, fruits and vegetables which are among the foods that contain precursors to inositol and tryptophan which are important to brain health as opposed to people with lower scores (Grases et al., 2019). In line with these findings, cardioprotective diets that are high in fruits and vegetables and low in fat and refined sugar have been found to predict a lower risk of depression (Martínez-González, 2016). Overall, studies examining food choices under stress have found that people, particularly women, consume more types of food than they usually avoid for health reasons (Zellner et al., 2006). Regarding depression and dietary habits, most studies focused on the effects of certain diets on depression. These studies have shown that adherence to certain diets that provide healthier food choices results in improved mental health in depressed individuals (Jacka et al., 2017). Evidence also suggests that certain nutrients can positively affect mood and be used to treat depression, whereas other nutrients can increase the risk

of it (Volker and Ng, 2006; Popa and Ladea, 2012). Moreover, it has been reported that poor dietary patterns could promote depressive symptoms (Jacka et al., 2014).

Studies that have sought to map the relationship between mental health symptoms (stress and depressive symptoms) and diet have reported that unhealthy food intake increases with perceived stress and depressive symptoms. Furthermore, unhealthy food consumption was linked to perceived stress in women only; however, depressive symptoms were linked to unhealthy food intake in both males and females (Mikolajczyk et al., 2009; El Ansari et al., 2014). A similar study concluded that levels of perceived stress and depressive symptoms increased with a decrease in fresh food intake and an increase in ready-to-eat food intake, and vice versa (Liu et al., 2007).

College students are vulnerable to vicious cycles in which poor diet choices and mental health symptoms perpetuate each other. Due to their new environment, responsibilities, financial pressure, and time management struggles, students are more prone to experience stress (Schmidt, 2012). Long-lasting stress has been found to be associated with weight gain as it triggers eating more frequently and less healthy (Torres and Nowson, 2007; Roberts, 2008). Depression can also lead to overeating or undereating (Kramlinger, 2001; Volker and Ng, 2006). However, research on the effects of stress and depression on dietary habits and choices in the UAE or the Middle East, specifically in Gulf Cooperation Council (GCC) countries, is limited and outdated. To the best of our knowledge, no studies have been conducted on UAE college students regarding the relationships between dietary habits, depressive symptoms, and perceived stress. Therefore, in this study, the association between frequency of food consumption and two mental health indicators (perceived stress and depressive symptoms) was assessed in female university students in the UAE.

MATERIALS AND METHODS

Study Design

This cross-sectional study was conducted following obtaining ethical clearance. After obtaining written informed consent, the participants were asked to complete a 12-item food frequency questionnaire (FFQ), Beck Depression Inventory, and Cohen's Perceived Stress Scale, which were compiled into a single questionnaire. The details of the study methodology have been described elsewhere (Ali et al., 2021).

Population and Sampling

The sample was drawn from female students at a national university in the United Arab Emirates (UAE). Several classes were randomly chosen from a list of courses held in spring 2018. The data were collected from April to May 2018. The sample represented ~10% of the target population of 4,000 students and resulting in a total sample size of 389 students. A total of 385 questionnaires were accepted, resulting in a response rate of 98.9%. Before data collection, a pilot study was conducted on a sample of ten students to verify that the questionnaire was well-understood and appropriate for use with the intended

sample. Pilot study participants were not included in the final data analysis.

Materials

Data were collected through a self-reported questionnaire consisting of three sections: a 12-item food frequency questionnaire, the 10-item Cohen's Perceived Stress Scale (PSS), and the Beck Depression Inventory-II (BDI-II). Weight and height were self-reported, which might have been a potential source of bias.

Food Frequency Questionnaire

The Food Frequency Questionnaire (Mikolajczyk et al., 2009) assessed the frequency of consumption of 12 food groups: sweets, cake/cookies, snacks, fast food/canned food, fresh fruits, salad/raw vegetables, cooked vegetables, soft drinks, meat/sausage products, fish/seafood, milk/milk products, and cereal/cereal products. Students were asked to answer the question "How often do you eat the following foods?" on a 5-point scale (several times a day = 5, daily = 4, several times a week = 3, 1–4 times a month = 2, and never = 1). Cronbach's α = 0.68. The FFQ was used in previous studies (Mikolajczyk et al., 2009; El Ansari et al., 2014; El Ansari and Berg-Beckhoff, 2015). Although not formally validated, the FFQ we used contains food groups that are essential for studying dietary behavior, which in line with the contents of other validated FFQs (Mikolajczyk et al., 2009).

Cohen's Perceived Stress Scale

The PSS estimates the degree to which situations in a person's life are considered stressful through 10 items (Cohen et al., 1983; Cohen and Williamson, 1988). Students expressed their feelings and thoughts for each item during the past month on a 5-point scale (0 = Never, 1 = Almost never, 2 = Sometimes, 3 = Fairly often, and 4 = Very often). In this study, the Cronbach's α was 0.68.

Beck Depression Inventory-II

The BDI-II measures the behavioral manifestation of depression (Salkind, 1969; Beck et al., 1996). The BDI-II was created in 1996 in alignment with the DSM-IV's diagnostic criteria for major depressive episode (Wang and Gorenstein, 2013). The BDI-II consists of 21 items with four statements each. Students were asked to choose one statement for each item that best described their feelings over the previous two weeks. The statements were scored on a 4-point scale ranging from 0 to 3. The creators of the BDI-II have enhanced validity compared to the original BDI (Beck et al., 1996). The Arabic version of the BDI-II (Ghareeb, 2000) was validated in 18 Arab countries: Palestine, Lebanon, Syria, Jordan, Saudi Arabia, Kuwait, Qatar, Bahrain, the United Arab Emirates, Oman, Yemen, Egypt, Sudan, Tunisia, Libya, Algeria, and Morocco, with Cronbach's α falling between 0.82 to 0.93 (Alansari, 2006; Maamria, 2010). To compensate for the removal of item 9 (suicidal thoughts and wishes), the scoring system was adjusted according to the ethical committee's instructions.

As a result, the BDI-II cut-off points were converted to percentages. The original BDI-II had a total score of 63, and the new score after deleting item 9 was 60. The BDI-II percentages were calculated by dividing by 63 and multiplying by 100 (63 was the total of score). The modified version of the BDI-II consists of 20 items, with a Cronbach's α of 0.89.

The original cut-off points of BDI-II:	The cut-off points as percentages:
(1–10) Normal ups and downs	(1.59–15.85) Normal ups and downs
(11–16) Mild mood disturbances	(17.46–25.40) Mild mood disturbances
(17–20) Borderline clinical depression	(27.98–31.75) Borderline clinical depression
(21–30) Moderate depression	(33.33–47.62) Moderate depression
(31–40) Severe depression	(49.21–63.49) Severe depression
(Over 40) Extreme depression	(Over 65.08) Extreme depression

Main Variables and Statistical Analysis

The FFQ consisted of 12 items, and was measured on a five-point scale (several times a day = 5, daily = 4, several times a week = 3, 1–4 times a month = 2, and never = 1).

To compare the results with those of other studies (Mikolajczyk et al., 2009), and by considering the least moderate correlations (Spearman > 0.2) among the items of each subscale and factor analysis and based on theoretical considerations regarding the content of foods, it was decided to combine some food groups into subscales. The following subscales were used: unhealthy foods subscale that consisting of sweets, cakes/cookies, snacks, and fast food and a fresh food subscale, consisting of fresh fruits, salads/raw vegetables, and cooked vegetables. The remaining food groups were divided into separate subscales. The subscales' scores were calculated as mean scores of the corresponding items.

The BDI-II score (BDI-II sum) was computed by summing the responses to all the 20 items that measured this mental health indicator. The Perceived Stress Score variable (PSS sum) was generated by summing all responses to all items of Cohen's Perceived Stress Scale after reversing scores to the four positively stated items (statements 4, 5, 7, and 8). Reversing was performed by recoding four statements: 0 for 4, 1 for 3, 2 kept as 2, 3 for 1, and 0 for 4.

The normality of all score variables was checked using kurtosis and skewedness, histograms, and Q-Q plots. All variables were normally distributed.

Independent associations between food groups (FFQ), perceived stress (PSS) and depressive symptoms (BDI-II) were examined using univariate and multivariate regression models. The newly created FFQ sum, PSS sum, and BDI-II sum served as dependent variables and were used for the subsequent data analysis. Sociodemographic and anthropometric variables were used as independent variables.

The collected data were coded, entered, and analyzed using the Statistical Package SPSS version 25. Statistical tests with p -values < 0.05 were considered statistically significant. Descriptive statistics was computed to describe all questionnaire items.

TABLE 1 | Sociodemographic characteristics and weight status (n = 385).

Characteristics	n	%
Emirate		
Dubai	290	75.3
Sharjah	49	12.7
Other	46	12.0
Marital Status		
Single	355	92.4
Married	29	7.6
Age		
17–20 years	233	62.2
21–24 years	134	35.7
25–29 years	8	2.1
Nationality		
Emirati	374	97.1
Non-emirati	11	2.9
University Year		
First year	87	23.0
Second year	90	23.8
Third year	113	29.9
Fourth years	88	23.3
BMI		
Underweight	49	13.4
Normal	196	53.6
Overweight	63	17.2
Obese	58	15.8

Multiple linear regression analysis was performed to predict each outcome variable using the following predictors: Marital status, age, BMI, exercise, stress, and depressive symptoms.

RESULTS

Sociodemographic Characteristics

Table 1 shows the participants' sociodemographic characteristics. The study population mainly consisted of Emiratis (97.1%). Their ages ranged from 17 to 24 years old. Regarding self-reported height and weight, 12.7% of the participants were underweight, 16.4% were overweight, and 15.1% were obese.

The mean scores were computed for the unhealthy food and fresh food subscales. Among this group of students, both unhealthy food and fresh food subscales had an average consumption (on a scale from 1 to 5). Overall, this group of students fell under the categories of “mild mood disturbances” and “moderate stress” for depressive symptoms and stress respectively.

Association Between Food Intake and Perceived Stress or Depressive Symptoms

The associations between the consumption of each food group and perceived stress and depression were assessed

TABLE 2 | Associations between food intake and perceived stress or depressive symptoms.

Food group	PSS ^a		BDI-II ^b	
	P-Value	Estimate*	P-Value	Estimate*
Sweets	0.369	−0.046	0.517	0.033
Cake/cookies	0.039	−0.106	0.296	−0.054
Snacks	0.417	−0.042	0.534	0.032
Fast food/canned food	0.333	−0.049	0.025	0.114
Fresh fruits	0.059	−0.097	0.017	−0.122
Salad/raw vegetables	0.045	0.103	0.209	0.064
Cooked vegetables	0.038	0.107	0.096	0.086
Soft drinks	0.697	0.020	0.015	0.124
Meat/sausage products	0.011	−0.130	0.159	−0.072
Fish/sea food	0.055	−0.098	0.322	−0.051
Milk/milk products	0.324	−0.051	0.951	−0.003
Cereal/cereal products	0.251	−0.059	0.984	−0.001
Unhealthy Food Subscale	0.127	−0.078	0.377	0.045
Fresh Food Subscale	0.295	0.054	0.685	0.021

*Estimates are the Standardized Coefficients. Change in food consumption for every one-unit change in the PSS or BDI-II.

^aPSS, Perceived Stress Scale.

^bBDI-II, Beck Depression Inventory II.

Food groups and PSS and BDI-II (univariable analysis). Bold means significant difference.

separately using a linear regression. **Table 2** shows that the significant associations between food groups, perceived stress, and depressive symptoms were not equal, whereas there were four associations for perceived stress and only three for depressive symptoms. Furthermore, negative associations were observed between perceived stress and cake/cookies and meat/sausage products, and between depressive symptoms and fresh fruits. Additionally, positive associations were observed between perceived stress and salad/raw vegetables and cooked vegetables and between depressive symptoms and soft drinks and fast food/canned food.

For every unit increase in PSS, the consumption of cake/cookies will decrease by 0.106, and meat/sausage product consumption will decrease by 0.130. However, salad/raw vegetable consumption will increase by 0.103 and cooked vegetable consumption will increase by 0.107. Regarding depressive symptoms, for every unit increase in the BDI-II, fresh fruits consumption will decrease by 0.122, fast/canned food consumption will increase by 0.114, while soft drink consumption will increase by 0.124 (**Table 2**).

Multiple linear regressions were used to assess the association between the consumption of all food groups together and both the PSS and BDI-II (**Table 3**). It was found that the consumption of unhealthy food, fresh food, fish/seafood, milk/milk products, and cereal/cereal products was not significantly associated with perceived stress and depressive symptoms among this group of university students. In addition, increased consumption of soft drinks was significantly associated with higher depressive symptoms, whereas increased consumption of meat/sausage products was significantly associated with lower perceived stress.

TABLE 3 | Food groups, PSS and BDI-II (multivariable analysis).

Food Subscale	PSS ^a		BDI-II ^b	
	P-Value	Estimate*	P-Value	Estimate*
Unhealthy food Subscale**	0.129	-0.086	0.928	0.005
Fresh food Subscale***	0.087	0.093	0.364	0.049
Soft drinks	0.147	0.083	0.012	0.145
Meat/sausage products	0.048	-0.114	0.126	-0.088
Fish/sea food	0.146	-0.085	0.279	-0.063
Milk/milk products	0.819	0.013	0.668	0.025
Cereal/cereal products	0.565	-0.032	0.810	0.014

*Estimates are the Standardized Coefficients. Change in food consumption for every one-unit change in the PSS or BDI-II.

**Unhealthy food Subscale: mean of four items (sweets, cakes/cookies, snacks, fast food).

***Fresh Subscale: mean of three items (fresh fruits, salads, cooked vegetables). Bold means significant difference.

TABLE 4 | General linear model for unhealthy food consumption.

Variable	β	S.E. ^a	P-value	95% Confidence Interval for β	
				Lower bound	Upper bound
Corrected model	-	-	0.141	-	-
Intercept	3.392	0.424	0.000	2.558	4.226
Marital Status	0.103	0.137	0.451	-0.166	0.373
Students Age	-0.011	0.021	0.599	-0.051	0.030
BMI	-0.011	0.041	0.793	-0.091	0.070
Exercise	-0.040	0.019	0.042	-0.078	-0.002
BDI-II	0.007	0.005	0.167	-0.003	0.016
PSS	-0.015	0.009	0.085	-0.032	0.002

R² = 0.028.

^aS.E., standard error. Bold means significant difference.

Unhealthy Food Consumption

Table 4 presents the results of the multiple linear regression model of unhealthy food consumption. This included marital status, age, BMI, exercise, BDI-II sum, and PSS sum. These variables accounted for only ~3% of the variation in the unhealthy food consumption subscale (R² = 0.028). However, this difference was not statistically significant (p = 0.141). Exercise was the only variable that had a significant effect on the unhealthy food consumption (p < 0.050).

DISCUSSION

The main objective of this study was to assess the association between perceived stress and depressive symptoms with the frequency of consumption of specific food groups among female university students. Habits formed during youth are likely to be sustained throughout later adulthood (Schmidt, 2012). Therefore, studying the complex relationship between food choice and mental state could help us to understand how the

frequency of consumption of certain food groups could be influenced by stress or depression, or vice versa.

The results of this study showed that the consumption of cakes/cookies and meat/sausage products was negatively associated with stress, whereas consumption of salad/raw vegetables and cooked vegetables was positively associated with stress. These results are inconsistent with those of other cross-sectional studies conducted on different populations. Several studies have reported higher consumption of sweets, snacks, and fast food with higher stress levels or higher consumption of fruits and vegetables with lower stress levels (Mikolajczyk et al., 2009; El Ansari and Berg-Beckhoff, 2015). Nevertheless, a study conducted in Palestine reported results similar to those of the present study.

It was found that among females, the consumption of cakes/cookies was negatively associated with stress, and among males, all food groups except cereal/cereal products were negatively associated with stress (Mohamed Yassin, 2016). The latter study suggested that lower consumption of cakes/cookies with higher stress could be linked to the fact that people consume foods high in carbohydrates (CHO) to relieve their stress. This could be explained by the fact that highly palatable foods that are high in CHO and fat, such as cakes/cookies, enhance opioid levels in the brain, which are linked to feelings of pleasure and are eaten as rewards after stress. Hence, students' stress levels were lower when they consumed these foods (Society for the Study of Ingestive Behavior, 2009; Mohamed Yassin, 2016). However, this suggestion is based on the assumption that students with lower stress levels who consumed more cakes and cookies were stressed before, and consumed more of this food group to relieve their symptoms. This assumption could not be confirmed by the current study design. Another possible explanation could be behavioral differences between stress and depression among individuals.

This study found that the consumption of fast food/canned food and soft drinks was positively associated with depressive symptoms whereas, the consumption of fresh fruits was negatively associated with depressive symptoms. These results are consistent with those of similar studies found regarding these food groups and depressive symptoms (Mikolajczyk et al., 2009; El Ansari et al., 2014; Martínez-González, 2016). Previous studies have found that consuming foods such as fruits, vegetables, seafood, and low processed organ meats that are rich in antidepressant nutrients is associated with a lower risk of depression (Martínez-González, 2016). In addition to the fact that highly processed and high-sugar foods are among the foods linked to depression, low-processed organ meats, seafood, and legumes were found to have the highest levels of antidepressants (Martínez-González, 2016). In line with these findings, the current study found a negative association between vegetable consumption and depression; however, no significant effects were found regarding for seafood, organ meat, or legumes consumption. Depression reflects behavioral changes in people with higher levels of depressive symptoms. Thus, individuals with depressive symptoms are more likely isolate themselves from their social networks, which might increase their symptoms. Unlike stress, depression creates feelings of emptiness and

hopelessness, pointlessness of efforts and severe reduction in the perception of self-efficacy (Brouwers and Tomic, 2000; Bisschop et al., 2004; Gallagher et al., 2011).

As such, making an effort to eat healthier food for people with depression would not be significant; hence, the tendency we report here to consume more easily accessible foods that fall under the unhealthy food groups in the high-depression group. However, it may still be considered important and possible to eat healthily; hence, there is a positive link between higher levels of stress and healthier eating behaviors. It may be interest in the future to investigate the extent to which there is a discrepancy between the wish to eat healthily and the actual dietary behavior of the high-stress group. Importantly, it would be interesting to determine the extent to which a higher discrepancy (between wish and actual dietary behavior) is linked via dissonance, to the levels of stress reported in this group.

This study found only one significant association between stress and one with depressive symptoms. Consumption of meat/sausage products was negatively associated with stress, whereas the consumption of soft drinks was positively associated with depressive symptoms. These findings are not consistent with findings from other studies that found positive associations between unhealthy food (sweets/snacks/cookies/fast food) and stress and depression, nor with studies that found negative associations between healthy food (fruits and vegetables) and stress and depression (Mikolajczyk et al., 2009; El Ansari et al., 2014). However, Yassin et al. found that stress was negatively associated with unhealthy food consumption among males only, which is similar to the insignificant result found in this study regarding the unhealthy food subscale and stress (Mohamed Yassin, 2016). First, the explanation for the negative association found between meat/sausage product consumption and stress is not known, although it could mean that lower stress leads to an increased consumption of protein. Future studies are needed to further investigate this association. Second, the positive association between soft drink consumption and depressive symptoms could be related to behavioral changes in people with higher depressive symptoms, as previously mentioned.

Finally, the general linear regression model controlling for confounding variables showed that exercise was the only variable that predicted unhealthy food consumption. The results showed that the frequency of exercise decreased with a higher consumption of unhealthy food. Previous studies found that individuals who report higher levels of physical activity have lower levels of stress and depression. Therefore, there may be an indirect association between the two mental health indicators and unhealthy food consumption (Norris et al., 1992; Hassmén et al., 2000). Unhealthy food consumption could be affected more by variables not included in this study, which should be investigated in future studies. The chief among these are socioeconomic variables, variables related to parents' educational level, and other social factors. As this study is cross-sectional, causation could not

be derived and was susceptible to bias. Therefore, future studies should focus on clinical and controlled experiments.

CONCLUSION

This study found associations between stress, and depression, with food consumption among female university students. In contrast to stress, feelings of hopelessness, which are symptomatic of depression, reduce the importance of consuming healthier food. Additionally, eating cakes/cookies was negatively associated with perceived stress. However, assessing the presence of pre-existing stress that affects food consumption was not within the scope of this study. Further studies are required to investigate the relationship between stress and food consumption in this population and to identify the main reasons for this relationship. This study suggests identifying nutritional issues when addressing perceived stress or depressive symptoms among female university students. Moreover, improving the mental state of students could improve their food choice and intake.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Mercedes Sheen Chair of the Research Ethics Committee, Zayed University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

OM wrote the initial draft of the manuscript, compiled the instruments in one questionnaire and performed data collection. HA supervised the project, provided guidance and advice when needed. LS performed data analysis, wrote the initial draft of the statistical analysis and results. EH provided guidance regarding the mental health indicators and the instruments used to assess them in addition to contributing to the discussion. RA provided guidance regarding the food frequency questionnaire and suggested the adjustments of the BDI-II scoring system to compensate for the obligatory removal of one item. All authors contributed to the article and approved the submitted version.

ACKNOWLEDGMENTS

We would like to thank Dr. Walid El Ansari from University of Gloucestershire, Gloucester - United Kingdom, for providing some of the instruments as this study was based on his previous work.

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