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“Toxic pleasures”: A study of eating out behavior in Arab female university students and its associations with psychological distress and disordered eating

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ABSTRACT

University years are a critical period in which young people establish independence and adopt lasting health behaviors. The aim of this study was to estimate the associations between eating out, psychological distress, and disordered eating behaviors among young Arab females in Qatar a rapidly developing small nation. A cross-sectional probability-based survey of 1615 Qatar University's female students assessed the frequency of eating out (main independent variable) and other eating behaviors in relation to two main dependent variables, disordered eating and psychological distress, which were measured using the Eating Attitudes Test and the Kessler Psychological Distress Scale, respectively. Multivariable logistic-regression analyses were used to estimate these two main associations with and without adjustment for other potential confounding variables, including the main effects of psychological distress and disordered eating on each other. Of the students, 45% reported eating out 3 times or more a week. Furthermore, approximately 18% screened positive for disordered eating and 33% reported high levels of psychological distress in the past 30 days. After adjustment for other variables, eating out 5 times or more a week was not significantly associated with the odds of disordered eating (OR 1.21, $p = 0.32$). However, eating out 5 times or more per week was significantly associated with odds of having psychological distress (OR 1.46, $p = 0.03$). Both psychological distress and disordered eating were strongly associated with each other (OR 2.58, $p < 0.001$).

1. Introduction

Since the 1970s, obesity rates have dramatically increased across the world (Finkelstein et al., 2012). These trends are partially driven by the modern diet, consisting largely of processed foods that are calorie dense, nutritionally poor, high in saturated fats, salt, and sugars (Bowman & Vinyard, 2004). Additionally, the low cost, wide availability, and convenience of this type of diet has been implicated in the global obesity problem creating the “toxic” food environment that we live in today (Xu, Short, & Liu, 2013). In support of this, many studies have shown that the frequency of eating out has steadily increased over the last few decades in step with obesity, and this trend is likely to continue (Garriguet, 2007; Kant & Graubard, 2004; Keke & Yana, 2014). Moreover, the introduction of “healthier” lower calorie options has not led to a reduction in the overall caloric intake or obesity rates (Chandon & Wansink, 2007). Eating out is particularly popular among young adults; 40% of total daily energy intake for this age group is away from home (Larson, Neumark-Sztainer, Laska, & Story, 2011) leading to considerable weight gain and other health conditions (Duffey, Gordon-Larsen, Jacobs, Williams, & Popkin, 2007; Pereira et al., 2005).

University years are a critical period for weight gain (Crombie, Ilich, Dutton, Panton, & Abood, 2009; Vella-Zarb & Elgar, 2009).

Furthermore, it is also a period of marked by stress, anxiety, depression, eating problems, and other psychological issues (Cooley, Toray, Valdez, & Tee, 2007; Tosevski, Milovancevic, & Gajic, 2010). Psychological distress is a state of reduced wellbeing marked by feelings of sadness, hopelessness, restlessness, and tension (Mirowsky & Ross, 2002). Disordered eating is a constellation of abnormal eating-related attitudes and behaviors that have much in common with eating disorders including poor health and emotional outcomes (American Psychiatric Association, 2000). Disordered attitudes include preoccupation with being thin. Extreme eating behaviors include, but are not limited to binge eating, strict dieting for weight loss, and laxative, or diuretic use (Reba-Harrelson et al., 2009).

Although many studies looked at the associations between eating out, psychological distress, and disordered eating separately in relation to obesity (Desai, Miller, Staples, & Bravender, 2008; Faith, Matz, & Jorge, 2002; French, Perry, Leon, & Fulkerson, 1995; Herva et al., 2006) or in relation to each other (Gadalla & Piran, 2008); few studies examined the associations between these three phenomena. This is surprising since the consumption of processed foods has been linked to obesity (Pereira et al., 2005; Prentice & Jebb, 2003) with overlapping etiology between obesity and disordered eating (Rancourt & McCullough, 2015) and the consumption of processed foods and psychological distress (Knuppel, Shipley, Llewellyn, & Brunner, 2017).

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Additionally, processed foods intake has also been implicated in over-eating behaviors through disturbances in satiety responsiveness, further increasing risk for disordered eating and obesity (Joyner, Gearhardt, & White, 2015; Vaughn et al., 2017). Therefore, studying this triad in university students may offer an opportunity to understand how exposure to processed foods through eating out may initiate the vicious cycle of psychological distress and disordered eating, potentially leading to eating disorders and psychiatric comorbidities.

In the Middle East, obesity has become a major health problem among young adults in their university years (Ben Haider & Ziyab, 2016; Moradi-Lakeh et al., 2016). Furthermore, there is growing evidence that disordered eating and poor mental health are on the rise among University students especially females in this region. Disordered eating among young females in Arab countries is relatively common ranging from 16.2 to 42.7% (Musaiger et al., 2013b). High prevalence of mental disorders among adults has also been reported with younger females being at higher risk (Ghuloum, Bener, & Abou-Saleh, 2011).

Qatar is a rapidly developing small nation in the Arabian Peninsula. This conservative Muslim country has witnessed remarkable rates of economic growth, Westernization, and modernization (Khondker, 2011). In 2006, the prevalence of obesity was 34.2% among the Qatari population (World Health Organization, 2006), which increased to 44.0% in 2016 (Biobank, 2016–2017). Poor dietary patterns remain a major public health challenge, with up to 91% of the population reporting consuming < 5 servings of fruit and vegetable per day (Haj Bakri & Al-Thani, 2013). A study of university students in Qatar showed those who eat the most fast food or foods high in sugar, also consumed the least vegetables and fruits, were also least physically active, and had the highest Body Mass Index (BMI) (Al-Nakeeb, Lyons, Dodd, & Al-Nuaim, 2015). However, there is a dearth of studies that explore the association between eating out, weight-related behaviors, and psychological distress in young female University students in Qatar. Few studies reported on these associations in Arab women (Schulte & Thomas, 2013) and to our knowledge there are no studies reported on the link between frequency of eating out, disordered eating, psychological distress and their inter-relationships in this region. Understanding them may help inform health initiatives and interventions. Therefore, the aim of this study is to estimate these associations in a representative sample of female students enrolled at Qatar's national university.

2. Methods

2.1. Sample design

Qatar University is the oldest and largest university in the state of Qatar with almost 20,000 undergraduate students enrolled in 2016. Female students make up approximately 70% of the student population. This study is based on an all-female survey of attitudes and behaviors towards nutrition conducted by the Social and Economic Survey Research Institute between April and May of 2016. A frame of all undergraduate students enrolled as of September of 2016 was used. After applying all eligibility criteria (female only, complete contact information, not in the last year of study as a second follow-up wave was in plan), the remaining 8971 constituted our target population, which was divided into ten strata based on: nationality (Qatari, Non-Qatari) and program year (five levels). Random systematic stratified sampling was used to select the study's sample ($n = 3450$). A total of 1810 surveys were attempted, of which 1793 were fully completed (i.e. reached the last question in the survey). The final sample was 1615, arrived at after data cleaning and applying other exclusion criteria including removing cases where the main exposure and/or outcome measures were missing ($n = 178$) including missing values on any one of the three main variables ($n = 153$) and missing values on two of the three main variables ($n = 20$).

2.2. Survey mode and administration

The study's questionnaire was a thirty-minute online survey, programmed and administered in Qualtrics (Qualtrics, 2005). Ethics approval was obtained from the university's Institutional Review Board. Participants had a choice to complete the survey in either English or Arabic using their laptops, computers, mobile phones, or tablets. In addition to main study measures, questions about general health, dietary habits, weight, height, weight perception, and weight-related concerns and behaviors were also included.

2.3. Measures

2.3.1. Frequency of eating out

Students were asked "How many times do you eat a meal away from home, or get take-out food?" Eight response categories were provided: "never", "1 time a month or less", "2 to 3 times per month", "1 to 2 times per week", "3 to 4 times per week", "5 to 6 times per week", "once a day", and "more than once a day". After exploring the distribution of this positively skewed variable, a three level variable was derived by collapsing the first four categories (54.9%), 3 to 4 times per week (25.3%), and finally collapsing the remaining categories (19.9%). For ease of interpretation, we refer hereafter to these three frequency groups by the number of times a person reported eating out per week corresponding to 2 times or less (low), 3–4 times (moderate), and 5 times or more (high), respectively.

2.3.2. Psychological distress (K6 scale)

The Kessler Psychological Distress Scale (K6) is a 6-item, 5-point Likert scale ("none of the time", "a little of the time", "some of the time", "most of the time", and "all of the time") with total score ranging from 0 to 24. The K6 is widely used measure for screening and assessing the severity of anxiety and depressive symptoms over the past 30 days (Kessler et al., 2002). This measure was validated in Arabic-speaking populations (Easton, Safadi, Wang, & Hasson, 2017). Multiple studies have demonstrated the effectiveness of K6 over longer measures in capturing non-specific psychological distress in non-clinical populations (Baggaley et al., 2007; Furukawa, Kessler, Slade, & Andrews, 2003; Veldhuizen, Cairney, Kurdyak, & Streiner, 2007). A previous study showed a cut-off of 13 or higher was ideal for equalizing false positives and negatives (Kessler et al., 2003). This cut-off was used in this study to identify clinically significant levels referred to as psychological distress hereafter.

2.3.3. Disordered eating (EAT-26)

Disordered eating was measured using the Eating Attitudes Test (EAT-26), a 26-item, 6-point Likert scale (always, usually, often, sometimes, rarely, or never) with a score ranging from (0 to 78) (Garner & Garfinkel, 1979; Garner, Olmsted, Bohr, & Garfinkel, 1982). The EAT-26 can be used as a screening tool in non-clinical populations for undifferentiated eating disorders (Mintz & O'Halloran, 2000) and is currently one of the most widely used measures of disordered eating attitudes and behaviors in college student populations. It was previously validated in Arabic-speaking college students' population (Khaled, Kimmel, & Le Trung, 2018; Nasser, 1994). A cut off score of 20 and above is considered indicative of clinically significant levels of disturbances (Garner et al., 1982) referred to as disordered eating hereafter.

2.3.4. Other eating behaviors and variables

Other potential confounding covariates were selected a priori because of their known joint associations with psychological distress, disordered eating patterns, higher BMI and/or poor diet quality among college students. These variables included frequency of eating breakfast (Hong & Peltzer, 2017; Lien, 2007; Ramli & Appukutty, 2018), eating meals within few hours before sleeping (Reid, Baron, & Zee, 2014;

Striegel-Moore et al., 2010), taking vitamin supplements (Mamtani et al., 2015), and the ability to handle difficulties or problems (Power, 2016). All these other eating behaviors were assessed in the past 6 months using seven-point Likert scale, while ability to handle stress was assessed using a 5-point Likert scale. BMI was calculated from the self-reported weight and height measurements. Accordingly, participants were classified as underweight if BMI \leq 18.4, normal weight if BMI \geq 18.5 and BMI \geq 24.9, and overweight or obese if BMI \geq 25.

2.4. Statistical analysis

Descriptive analysis explored characteristics of the sample concerning frequency of eating out to the dependent variables – psychological distress and disordered eating – and other potential confounding variables. Weighted proportions with corresponding 95% confidence intervals (CI) were estimated for categorical variables and means with standard deviations for continuous variables. Means were compared using the adjusted Wald test for complex survey design. Similarly, to correct for survey design effects on the variances of reported proportions, the F-transformed version of the Pearson Chi-square statistic was used (Heeringa, West, & Berglund, 2011).

To explore the association between frequency of eating out and our main dependent variables, separate logistic regression models were fit. The crude model explored each dependent variable and its association to eating out. Model 1 adjusted for disordered eating when psychological distress was the dependent variable and for psychological distress when disordered eating was the dependent variable. Model 2 further adjusted for other eating-related covariates. Model 3 adjusted for marital status, father's education, social economic status (SES), and age. The odds ratio (OR) and corresponding 95% (CI) and p-values for each coefficient were reported. Model selection was based on forward stepwise addition leading to the fully adjusted model. We evaluated the contribution of each independent variable to the model using the F-adjusted Wald test and the F-adjusted mean residual goodness of fit test (Hosmer, Stanley, & Rodney, 2013). Categorical variables were grouped into fewer levels to gain more power to detect statistically significant effects after establishing no significant differences between levels using the Wald test. Missing data were handled using case-wise deletion. There were no statistically significant differences between those who provided complete or incomplete responses on eating out, BMI or other important covariates (see Supplementary Table 1). Statistical significance was determined using an alpha value of 0.05. All analyses were conducted in STATA 14.

3. Results

The K6 was normally distributed with mean score of 11.0, Standard Deviation (SD) = 5.4, Skewness = 0.2, and Kurtosis = 2.5. The K6 had a good internal consistency with Cronbach alpha value of 0.85 and average inter-item covariance of 0.69. The EAT-26 was positively skewed with mean score of 12.5, SD = 9.6, Skewness = 1.5, and Kurtosis = 6.1. The EAT-26 had a good internal consistency with Cronbach alpha value of 0.82 and average inter-item covariance of 0.20.

Characteristics of the sample are shown in Table 1. Approximately, 32% of students reported psychological distress in the past 30 days, and 19% presented with disordered eating. Of those psychologically distressed, 28.4% also reported disordered eating, compared to 14.3% in the non-psychologically distressed group ($p < 0.001$). Of those with disordered eating, almost half (47.9%) were psychologically distressed, compared to 28% among non-psychologically distressed group ($p < 0.001$).

Results from the bivariate analysis (not shown) show that those who were psychologically distressed were significantly different from non-psychologically distressed group across eating out groups ($p = 0.005$). However, those with disordered eating were not significantly different

Table 1
Sample characteristics.

Variable	% ^a	CI %	n
<i>Eating out per week</i>			
2 times or less (low)	54.79	52.56–57.00	979
3–4 times (moderate)	25.33	23.43–27.33	453
5 times or more (high)	19.88	18.15–21.72	360
<i>Psychological distress</i>			
Yes	31.77	29.73–33.87	517
No	68.23	66.13–70.27	1098
<i>Disordered eating</i>			
Yes	18.79	17.1–20.61	300
No	81.21	79.39–82.90	1315
<i>Body Mass Index</i>			
Underweight	12.18	10.75–13.76	188
Normal weight	50.77	48.46–53.07	775
Overweight	22.04	20.19–24.02	334
Obese	15.01	13.42–16.74	227
<i>Nationality^b</i>			
Qatari	66.42		1012
Non-Qatari	33.58		603
<i>Marital status</i>			
Never married	79.49	77.35–81.33	1095
Married	17.49	15.69–19.45	228
Separated/divorced/widowed	3.10	2.33–4.10	40
<i>Father education</i>			
Less than high school	29.06	26.78–31.44	365
High school	24.43	22.31–26.69	316
Post-secondary	46.51	43.97–49.07	601
<i>Socioeconomic status</i>			
Challenged	3.98	3.15–5.04	56
Stable	29.15	26.97–31.44	385
Comfortable	66.86	64.55–69.09	856

^a Percentages reported were calculated using survey weights and therefore differ from the raw percentages. The number of respondents reported for each variable corresponds to the unweighted sample.

^b Due to study design standard error in nationality is < 0.001 .

from the non-disordered eating group across eating out groups ($p = 0.088$). Mean BMI was not significantly different across eating out groups where low, moderate, high consumption had mean BMI values of 24.4, 24.3, and 24.5 ($F_{2, 1524} = 0.09$, $p = 0.91$), respectively.

Table 2 shows findings in relation to psychological distress and other variables. While adjusting for potential confounders, eating out moderately was not significantly associated with odds of psychological distress compared to low consumption. However, high frequency of eating out significantly increased the odds compared to low consumption (OR 1.46 CI: 1.04–2.04). Participants with obesity had 92% higher odds of psychological distress compared to normal weight students (OR 1.92 CI: 1.30–2.84).

Table 3 shows results from the logistic regression models with EAT-26 as dependent variable. After adjusting for confounding variables, psychological distress was significantly associated with disordered eating, increasing the odds of disordered eating by approximately two and half fold (OR 2.57 CI: 1.86–3.54). Strong associations were observed between higher BMI categories and disordered eating: overweight (OR 1.88 CI: 1.29–2.76) and obese (OR 2.71 CI: 1.80–4.07) compared to normal weight, respectively.

4. Discussion

The present study explored the associations between frequency of eating out, psychological distress, and disordered eating in a large representative sample of female students attending Qatar University. A large proportion (45%) reported eating out of their home on a regular basis (3 to 4 times or more a week). Furthermore, 18% screened positive for disordered eating and 33% reported psychological distress in

Table 2
Logistic models for the associations of eating out with psychological distress.

Independent variables	Crude model		Model 1 (N = 1615)		Model 2 (N = 1226)		Model 3 ^a (N = 1028)	
	OR (95% CI)	p-Value	OR (95% CI)	p-Value	OR (95% CI)	p-Value	OR (95% CI)	p-Value
Eat out per week								
Moderate	1.09 (0.84–1.35)	0.54	1.08 (0.85–1.37)	0.53	0.96 (0.72–1.30)	0.81	1.05 (0.75–1.47)	0.76
High	1.44 (1.17–1.90)	0.001	1.44 (1.12–1.85)	0.003	1.42 (1.06–1.92)	0.02	1.46 (1.05–2.05)	0.03
Eating disorder								
Yes			2.34 (1.85–2.96)	< 0.001	2.63 (1.96–3.53)	< 0.001	2.58 (1.86–3.56)	< 0.001
Eating a meal 1–2 h before sleeping								
Yes					1.46 (1.15–1.86)	0.002	1.66 (1.27–2.18)	< 0.001
Breakfast								
Yes					0.81 (0.63–1.05)	0.11	0.92 (0.70–1.22)	0.57
Vitamins								
Yes					0.91 (0.69–1.21)	0.53	0.99 (0.72–1.36)	0.94
Able to handle problems								
Yes					0.39 (0.29–0.51)	< 0.001	0.35 (0.26–0.48)	< 0.001
Body Mass Index								
Underweight					1.33 (0.90–1.96)	0.15	1.37 (0.90–2.07)	0.14
Overweight					1.40 (1.03–1.91)	0.03	1.39 (0.98–1.97)	0.06
Obese					1.81 (1.29–2.53)	0.001	1.92 (1.30–2.84)	0.001

^a Adjusted for nationality, marital status, age, father education, and social economic status; low frequency is the reference category for eating out variable; normal weight is the reference category for Body Mass Index.

the past 30 days. The high prevalence of these conditions in conjunction with the high prevalence of being overweight and obese in this young population, approximately 37%, call for urgent health promotion programs.

In this study, higher frequency of eating out was strongly associated with psychological distress. Specifically, those who reported high consumption had 46% increased odds of experiencing psychological distress compared to low consumption. However, higher levels of eating out were not associated with disordered eating; showing borderline significance. Furthermore, we found no significant association between disordered eating and moderate eating out frequency compared to low consumption.

While higher BMI appeared to be strongly associated with disordered eating in our sample consistent with previous studies (Musaiger et al., 2013b; Reed, Micali, Bulik, Davey Smith, & Wade, 2017), to our surprise we found that eating out was not associated with any BMI categories. Furthermore, in contrast to the dose-response association between BMI and disordered eating, its association to psychological distress was restricted to respondents with obesity.

While our findings show no association between eating out and BMI

and no association between eating out and disordered eating, these findings may well be due to self-report nature of the eating out measure used in our study. Specifically, it is possible that students who were overweight or obese were more likely to under report the frequency of eating out relative to normal weight and underweight students (Bellisle, McDevitt, & Prentice, 1997; Palmer, Capra, & Baines, 2009). As BMI and disordered eating were strongly associated with each other, this measurement bias in frequency of eating out by BMI categories may have influenced the estimate of the association between eating out and disordered eating observed in our study towards the null.

In our study, we were able to replicate previous findings showing that psychological distress and disordered eating are strongly associated with each other. A recent longitudinal study supported bidirectional associations between these two variables were higher levels of psychological distress predicted greater levels of disordered eating and vice versa (Mitchison, Morin, Mond, Slewa-Younan, & Hay, 2015). Furthermore, our study extends existing literature by highlighting a strong link between high frequency of eating out and psychological distress suggesting a link between eating behavior and mental health. This is not surprising, since the stomach and brain are highly integrated organs

Table 3
Logistic models for the associations of eating out with disordered eating (EAT-26).

Dependent variables	Crude model		Model 1 (N = 1615)		Model 2 (N = 1226)		Model 3 ^a (N = 1028)	
	OR (95% CI)	p-Value	OR (95% CI)	p-Value	OR (95% CI)	p-Value	OR (95% CI)	p-Value
Eat out per week								
Moderate	0.93 (0.70–1.23)	0.62	0.91 (0.69–1.22)	0.54	1.07 (0.76–1.52)	0.70	1.10 (0.75–1.60)	0.63
High	1.32 (0.99–1.78)	0.06	1.22 (0.92–1.64)	0.17	1.30 (0.92–1.87)	0.14	1.21 (0.83–1.78)	0.32
Psychological distress								
Yes			2.34 (1.85–2.95)	< 0.001	2.64 (1.97–3.53)	< 0.001	2.57 (1.86–3.54)	< 0.001
Eat meal 1–2 h before sleeping								
Yes					0.99 (0.75–1.33)	0.99	0.91 (0.67–1.24)	0.55
Breakfast								
Yes					0.93 (0.69–1.26)	0.64	0.98 (0.71–1.36)	0.92
Vitamins								
Yes					1.57 (1.15–2.14)	0.005	1.56 (1.12–2.18)	0.01
Able to handle problems								
Yes					1.11 (0.79–1.57)	0.55	1.05 (0.73–1.52)	0.80
Body Mass Index								
Underweight					0.87 (0.51–1.48)	0.60	0.80 (0.46–1.41)	0.44
Overweight					2.17 (1.52–3.10)	< 0.001	1.88 (1.29–2.76)	0.001
Obese					3.71 (2.58–5.33)	< 0.001	2.71 (1.81–4.07)	< 0.001

^a Adjusted for nationality, marital status, age, father education, and social economic status.

with bidirectional communication.

Several studies have linked poor digestive health to poor mental health including stress, anxiety, and depression (Foster & Neufeld, 2014; Koloski et al., 2012). Furthermore, eating out may be a contributor to higher levels of psychological distress, possibly through exposure to a poor nutrient profile. For example, existing evidence support a link between nutritional imbalances and disturbances in serotonergic and dopaminergic pathways implicated in mood and anxiety disorders (Walsh, 2014). Additionally, existing evidence supports the role of high fat and sugar contents to imbalances in the digestive microbiome (Vaughn et al., 2017). These imbalances are present in obesity, mood and anxiety disorders as well as gastrointestinal disorders such as irritable bowel syndrome (Cryan & Dinan, 2012).

The association between eating out and psychological distress may also stem from other social and cultural variables related to increasing pressures on young women in this context to balance fast-paced lifestyles with traditional gender roles and social customs around food and eating. Compounded by lack of knowledge and skills to navigate the “toxic” food environment around them, young women in this context may be more vulnerable to poor dietary choices, while away from home at mealtimes. In fact, several studies conducted in other Arab countries reported on barriers to healthy eating that included limited knowledge and awareness of healthy food choices (Ali, Baynouna, & Bernsen, 2010; Ali, Bernsen, & Baynouna, 2008) and limited access to healthy food due to time constraints, family responsibilities, and workloads (Musaiger et al., 2013a).

4.1. Strengths, limitations, and future direction

The strength of this study is in its large sample size and homogeneity of its predominantly Muslim population with low levels of alcohol or substance use. However, the cross-sectional design is a major limitation. Another major limitation is that eating out behavior was measured using one question and no information about quality of foods consumed was collected. Future studies should investigate how well this ultra brief measure of eating out frequency correlate with higher energy intake, measured BMI, and macronutrient composition in this population. The study is also limited by lack of information on other potential confounding variables such as physical activity and smoking status. However, given the reported low prevalence (6.0%) of smoking behavior among adult Qatari women in general (Qatar Biobank, 2016–2017) and the negative cultural stereotypes against smoking among women of all ages, it is postulated their effects to be minimal. Furthermore, the role of sociocultural factors in relation to eating out and our main dependent variables although of interest, were not explored and should be investigated in future studies. These variables may be especially important for the development of community-based interventions for the prevention and management of overweight and obesity among young women in Qatar and other Arab countries. Since our study was based on an all-female sample, it is unclear how our findings would generalize to male university students.

4.2. Implications

In Qatar and other Arab countries, there have been little focus on the impact of changing food environment and eating behavior on obesity in young adults especially females who are at higher risk for obesity due to many sociocultural factors. This is the first study of its kind with a focus on potential eating-related behaviors that may initiate and exacerbate overweight and obesity levels in young adults who are undergoing major lifestyle changes while attending college or University. Notwithstanding limitations in our study design and measures, our findings strongly support positive associations between higher eating out frequency, psychological distress, and disordered eating, with significant associations between: eating out and psychological distress; obesity and psychological distress; overweight/ obesity

and disordered eating in this population. These findings suggest that frequent exposure to the modern food environment in largely traditional societies may be part of complex web of early changes in mood and eating-related behaviors that could potentially lead to eating disorders and obesity. Better understanding of these associations can lay grounds for improving prevention and treatment approaches for obesity and eating disorders in both non-Western and Western countries.

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.eatbeh.2018.08.008>.

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