

ORIGINAL ARTICLE

EATING STYLE AND THE NATURE OF FOOD CONSUMPTION: MAPPING INDIVIDUALS' HEALTH RISKS

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ABSTRACT

Research examining whether psychological eating style is related to healthy or unhealthy eating patterns is required to explain the mechanisms underlying non-communicable diseases and obesity. The purpose of this study was to investigate whether eating style predicts the nature of food consumption. This was a cross-sectional study of 588 adults (males = 231 and females = 357). Eating style (i.e. restrained, emotional, external eating) was measured using the short version of the Dutch Eating Behaviour Questionnaire (DEBQ). The nature of food consumption was assessed using self-reports of consumption of fruits and vegetables, sweet foods, junk food, and snacks. The results revealed that restrained eating was higher in females and overweight participants. External eating, a higher frequency of snacking, and a higher frequency of junk food consumption were more prevalent among the younger participants. Consistent with previous Western studies, emotional eating was found to be the main predictor of consumption of less healthful foods (sweet foods, junk food, and snacks), whereas external eating predicted the intake of sweet foods. The intake of fruits and vegetables was associated with restrained eating. In light of the significant associations between eating style and the nature of food consumption, acknowledging individuals' eating styles has implications for tailoring effective nutritional programs that address obesity and the chronic disease epidemic.

Key words: eating style, food consumption, adults, Malaysia

INTRODUCTION

Over the past few decades, overweight and obesity have affected a substantial number of Malaysians. Data from the Malaysian Adult Nutrition Survey (MANS) suggest an escalating prevalence of obesity from 12.2% in 2003 to 18.5% in 2014¹. On a related note, nations worldwide are facing a rising trend in major health problems caused by non-communicable diseases (NCD), such as diabetes, cancers, and cardiovascular diseases². For instance, NCDs account for 73% of Malaysia's total mortality and contribute to 20% of premature deaths³. It has long been recognized that many of the same factors that explain the emergence of obesity also explain a substantial amount of the NCD burden, notably, sedentary lifestyle, smoking, alcohol consumption, and poor eating patterns.

Recent years have witnessed a growing interest in studying the psychological factors associated with individual eating styles and eating patterns that might have important roles as triggers of excessive weight gain and NCD risk factors. Among adults,

several theories have hypothesised that overeating mediates the relationship between eating style and becoming overweight and obese⁴. The first theory, the *psychosomatic model*, proposed the concept of *emotion-induced eating*. According to this model, eating reduces anxiety and other negative emotions (e.g. stress, depression, loneliness, and anger) and is responsible for the development and maintenance of hyperphagia, which is believed to cause overweight and obesity⁵. As emotions strongly influence eating, emotional eaters do not eat in response to internal signals, feelings of hunger, or satiety⁶. It is important to note that previous research^{7,8} suggests that parental behaviour may contribute to the emergence of emotional eating, as parents use food for comfort or as rewards for children's behaviour. *Externality theory*, on the other hand, focuses on external influences on eating, including the sight and smell of food⁹. According to this theory, people who are more sensitive than others to external food cues, eat in response to those stimuli regardless of their state of hunger. Finally, according to the *restraint theory*, restrained eaters have conscious

determination and make efforts to restrict their food their intake and calories in order to control their body weight through self-control processes¹⁰. However, when self-control processes are undermined due to certain factors, such as stress and other negative states, disinhibition of eating occurs causing restrained eaters to be more likely to overeat than are unrestrained eaters¹¹.

Deriving principles from the aforementioned theories, Van Strien et al. (1986)¹² posited three common psychological types of eating styles: restrained eating, emotional eating, and external eating. Western studies provide ample evidence of the link between these three eating styles and body mass index (BMI) and overeating^{8,4, 13-15}. Whilst it has been hypothesized that these three eating styles have positive correlations with being overweight¹⁵, mixed findings have been reported. Several studies indicated that high-emotional eating^{8,12}, high-external eating⁸ and high-restrained eating¹⁶⁻¹⁷ were positively related to being overweight. However, other studies found that external eating^{15,18} and restrained eating¹⁹ were related to lower body weight.

Furthermore, a few studies^{15,20-21} have suggested that an individual's eating style is linked with the nature of food consumption (i.e. healthy or unhealthy intake). It has been proposed that emotional and external eating are problematic eating styles because they are associated with less healthy food intake²². However, studies examining the links between restrained eating and food consumption produced mixed results. For instance, Elflag and Murray²² found that restrained eating has been associated with healthier food choices. Nonetheless, other studies have reported an unhealthy pattern indicating that restrained eaters are more likely to consume more fat and fatty foods²³ and increased snacking²⁴ than unrestrained eaters. One set of studies²³ investigated the association between sugar-sweetened soft drinks and eating style. The study found that the intake of sweets was related to higher external eating, higher emotional eating and to less restrained eating. Another study²¹ that investigated food intake and eating style in parents and their children found that the intake of fruits and vegetables was associated with restrained eating, whereas the intake of sweets was related to more external and less restrained eating. Snoek et al.¹⁵ reported that adolescents whose scores indicated they were external eaters or emotional eaters ate more snacks, whereas higher scores of restrained eating were associated with fewer snacks.

Given that the obesity epidemic and the rapid increase in NCDs are causes for great concern,

research examining whether eating style is related to unhealthy or healthy eating patterns is needed to explain the mechanisms underlying obesity, and to inform health interventions aimed at reducing NCDs. Nevertheless, research of this kind has received scant attention in Malaysia. The justification for this focus is that individual differences in eating style might lead to excessive weight gain and damaging effects on health through the consumption of less healthy food. Particular types of food identified in the literature²⁵⁻²⁷ have been implicated in obesity and health outcomes: fruit and vegetable consumption, more palatable or easily consumed foods (i.e. junk food), food with particular sensory or health characteristics (i.e. sweet foods), and high energy food between meals (i.e. snacks). Accordingly, in the present study, food consumption was, therefore, operationalised as snacking, sweet food consumption, junk food intake, and fruit and vegetable consumption.

Hence, the main purpose of this study was to determine the relationship between eating style and the nature of food consumption in Malaysia. The current study also examined the relationship between participants' demographic characteristics and eating style and food consumption.

METHODOLOGY

Study Setting and Participants

The final sample comprised of 588 Malay adults (a response rate of 97.2%). The sample consisted of 231 males (39.3%) and 357 females (60.7 %) who volunteered to take part in the study. The age of the sample ranged from 19 to 64 (36.0±10.2). BMI was calculated using height and weight measurements. Participants with scores above 25 were considered overweight or obese²⁷. The mean BMI was 22.31 kg/m² (SD 4.52). A total of 440 (74.8%) participants had a body weight within the normal range and 148 (25.2%) were overweight and obese. They were recruited as a convenient sample from four workplaces in the Kuala Terengganu, Terengganu, employed in professional 178 (30.3%) and non-professional 374 (63.6%) occupations. The participants were recruited at their workplaces after informative meetings with representatives of the managements. Participants were informed about the purpose of the voluntary and confidential nature of participation.

Measures

Demographic characteristics

A structured questionnaire was used to collect data for the study. The demographic data (i.e. age, gender, occupational status, and BMI) were collected for each participant.

Eating style

Eating style was measured using the short version of the Dutch Eating Behaviour Questionnaire (DEBQ¹⁶, which is frequently used to assess the psychological dimensions of eating style in different countries²³. The DEBQ consists of 16 items answered on a 5-point scale, ranging from (1) never to (5) often, and a score for each subscale is calculated by summing the appropriate items. The instrument inquires about three eating patterns: restrained eating (5 items e.g. 'Do you try to eat less at mealtimes than you would like to eat?'), external eating (5 items e.g. 'Do you eat more if food tastes good?') and emotional eating (6 items e.g. 'Do you have a desire to eat when you are irritated?'). The standard procedures of back-translation were adopted to translate the scale to the Malay language. The psychometric properties of the Malay version of the DEBQ were examined and indicated good internal reliability. Cronbach's alphas in this study were: .82 (restrained eating), .90 (emotional eating), and .81 (external eating).

Nature of food consumption

Food consumption was measured using a questionnaire which inquired only about the frequency of eating certain types of food without specifying portion size. The questionnaire assessed the number of fruits and vegetables consumed, sweet food intake, and junk food consumption (e.g. 'How many times do you typically eat junk food in one day?'). The items were rated on a 4-point scale ranging from 1 (1) to 4 (more than 4 times). Snacking frequency was measured by asking one question: 'How many times do usually you snack per day?' The response was recorded on a 4-point scale ranging from 1 (1 time) to 4 (more than 3 times a day). In the present study, the participants were informed that a snack refers to any food consumed that does not constitute one of the main meals of the day¹¹, whereas junk food refers to a diet high in processed foods, including burgers, sausages, nuggets, and salty snacks, such as potato chips, corn chips, instant noodles, or other salty snacks. Sweet foods include ice-cream, cakes, sugared traditional *kuih*, sweets and candy, chocolate or other sweet food.

Statistical analysis

The mean scores for frequency of food intake and the DEBQ (emotional, external, and restrained eating) were calculated. Pearson's correlation was used to determine the associations between the variables measured. Hierarchical regression analyses were performed to examine the predictive effects of the demographic variables (i.e. gender, age) nutritional status (BMI; normal versus overweight), and the DEBQ. The demographic variables were entered in step 1 and the DEBQ in step 2. Missing data were replaced by the variable's mean.

RESULTS

Scores for eating styles and patterns of food consumption

The means and standard deviations are shown in Table 1. Emotional eating was the most prevalent eating style, followed by restrained eating and external eating. Table 1 also presents the Pearson's correlation coefficients for all the variables in the study. Of special interest are the correlations between gender, age, BMI, food consumption, and eating style. High emotional eating was significantly related to increased consumption of sweet foods, increased junk food consumption, and increased frequency of snacking. External eating was significantly related to a higher consumption of sweet foods and junk food. Restrained eating was significantly correlated with fruit and vegetable consumption. Finally, age was negatively related to junk food consumption, snacking, and external eating ($r \geq -.15$), in that the younger participants in the sample consumed junk food more frequently, snacked more often, and scored higher on external eating than the older participants. Of further interest are the study's significant findings by gender, with BMI differences in relation to eating styles and food consumption (see Table 2). The results of the statistical analyses suggest gender differences in the restrained eating scores, with women ($3.11 \pm .74$) having significantly higher mean scores for restrained eating than the men had ($2.91 \pm .83$). The results also showed that restrained eating was also higher among the overweight ($3.19 \pm .76$) than the normal-weight ($2.97 \pm .79$) participants. The overweight participants reported significantly lower fruit and vegetable consumption ($1.57 \pm .44$), compared to the normal-weight participants ($1.67 \pm .52$).

Table 1: Mean, Standard Deviations, and Inter-correlations for DEBQ and food consumption

variables	1	2	3	4	5	6	7	8	9	10
1. Fruit and vegetables	1									
2. Sweet food	.32**	1								
3. Junk food	.34**	.50**	1							
4. Snacking	.22**	.36**	.44**	1						
5. External	-.07	.17**	.12**	.10*	1					
6. Emotional	.06	.21**	.24**	.19**	.35**	1				
7. Restrained	.11**	-.03	.01	-.08	-.09*	.12**	1			
8. Gender ^a	.07	.02	.01	.00	-.03	.06	.12**	1		
9. BMI ^b	-.07	-.06	-.08	-.07	.02	.03	.16**	-.11**	1	
10. Age	.04	-.05	-.13**	-.15**	-.15**	-.08	.05	-.08*	.20**	1
Mean	1.64	1.40	1.19	1.28	2.83	2.18	3.03	n.a	22.31	36.0
SD	.50	.52	.49	.53	.71	.87	.79	n.a	4.52	10.2

Notes: * $p < .05$, ** $p < .001$; ^a0 = male, 1 = female, ^b0 = normal weight, 1 = overweight

Table 2. Means, standard deviations and t-test for gender and BMI

	Normal weight Sample	Overweight sample		Male sample	Female sample	
	Mean± SD	Mean± SD	t	Mean± SD	Mean± SD	t
Fruit and vegetable	1.67±.52	1.57±.44	2.13*	1.59±.49	1.67±.50	-1.91
Sweet food	1.41±.54	1.37±.45	.70	1.39±.49	1.41±.54	-.49
Junk food	1.21±.53	1.13±.35	1.85	1.19±.48	1.20±.50	-.24
Snacking	1.30±.55	1.20±.47	1.84	1.28±.53	1.28±.52	-.06
External	2.82±.72	2.87±.67	-.60	2.86±.72	2.81±.71	.71
Emotional	2.16±.85	2.26±.94	-.81	2.11±.89	2.23±.85	-1.58
Restrained	2.98±.78	3.19±.76	-2.41**	2.91±.83	3.11±.74	-3.01**

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$

Predictors offrequency of snacking, sweet food consumption, junk food consumption, and fruit and vegetable consumption

Table 3 presents the findings of hierarchical regression on the relationship between the demographic variables, eating style, and eating patterns (snacking, sweet food consumption, junk food consumption and fruit and vegetable consumption).

Step 1 explained a statistically significant proportion of the variance in snacking frequency, $R^2 = .03$, $F(3, 516) = 4.90$, $p < .01$. Age emerged as a significant predictor, in that younger age was associated with a higher frequency of snacking. Age remained a significant predictor after DEBQ was entered in step 2, $\Delta R^2 = .05$, $F(3, 513) = 9.67$, $p < .001$, along with emotional eating being a significant predictor. With regard to the consumption of sweet foods, regression analyses showed that all the demographic variables were non-significant $F(3, 516) = .50$, n.s. Emotional eating and external eating were significant predictors $\Delta R^2 = 0.06$, $F(3, 513) = 11.47$, $p < .001$ in step 2.

The demographic variables accounted for a statistically significant proportion of the variance in junk food intake, $R^2 = .02$, $F(3, 516) = 3.58$, $p < .05$, with age emerging as a significant predictor. This indicates that the younger individuals were more likely to report junk food intake. The addition of DEBQ to the equation resulted in a statistically significant increase in the explained variance, $\Delta R^2 = .07$, $F(3, 513) = 13.80$, $p < .001$. Emotional eating emerged as a significant predictor.

BMI was a significant predictor of fruit and vegetable consumption, $R^2 = .01$, $F(3, 516) = 3.08$, $p < .01$. The t -test showed that the normal-weight participants reported consuming significantly more fruits and vegetables. Adding DEBQ in step 2 produced a significant increase in the explained variance $\Delta R^2 = .03$, $F(3, 513) = 4.357$, $p < .01$; restrained eating was the independent predictor.

Table 3. Hierarchical regression of food consumption on demographic and DEBQ

	Snacking		Sweet food		Junk food		Fruit & vegetables	
	Step 1 <i>B</i>	Step 2 <i>B</i>	Step 1 <i>B</i>	Step 2 <i>B</i>	Step 1 <i>B</i>	Step 2 <i>B</i>	Step 1 <i>B</i>	Step 2 <i>B</i>
Step 1								
Gender	-.04	-.04	.00	.00	-.02	-.04	.07	.05
BMI	-.03	-.02	-.01	-.02	-.05	-.08	-.09*	-.11*
Age	-.15**	-.13**	-.05	-.01	-.13**	-.10**	.06	.06
Step 2								
Restrained		-.08		-.00		.04		.12**
Emotional		.22***		.17***		.23***		.07
External		.00		.14**		.06		-.05

* $p < .05$ ** $p < .01$ *** $p < .001$

DISCUSSION

The aims of this study were to obtain basic data concerning eating styles (DEBQ) and food consumption, and to test whether eating styles are associated with the nature of food consumption. The present study found a clear gender difference in the mean score for restrained eating. The results are similar to those found in previous studies showing that women had higher mean scores for restrained eating than men did^{15-16,28}. This finding can be explained by the fact that women are more likely to diet than men are¹⁶; they might have a greater awareness of and concern about food and a fear of gaining weight²⁹. Moreover, the current findings showed that restrained eating was associated with higher BMI or being overweight, suggesting restrained eating has an important role as a trigger of excessive weight gain. This finding is also consistent with the *restraint theory* and reports¹⁵⁻¹⁸ that being overweight is positively related to restrained eating.

The findings demonstrated age differences in eating styles, indicating that the younger participants scored significantly higher on external eating than the older ones did. Moreover, the results also showed that unhealthy eating patterns were more common among the younger participants. Specifically, being younger was associated with a higher frequency of snacking and a higher frequency of junk food consumption than was being older. The fact that unhealthy eating patterns were common in the younger adults might indicate generational differences in their food cultures²³ and health-related consciousness. Alternatively, higher scores on external eating might be an important explanatory variable for unhealthy food intake among the younger participants. This seems reasonable because external eaters are more sensitive to food cues and more likely to respond to food advertisements and marketing strategies¹⁵. In the present study's situation, unhealthy

food, including palatable snacks and junk food were readily available and easily accessible; thus, increasing exposure to such food could have encouraged more unhealthy food consumption particularly the younger generation.

Although this study found no significant association between emotional eating and being overweight, the results showed emotional eating to be the main predictor of unhealthy food consumption. As predicted (*Hypothesis 1*), individuals who scored high on emotional eating reported a higher frequency of snacking, higher consumption of sweet foods, and higher consumption of junk food. This finding is in line with previous observations of an association of emotional eating with the intake of sweet foods among women²² and a higher frequency of snacking^{15,20}. Previous research has noted that emotional eating, which implies eating in response to negative emotions, could be important for understanding the consumption of food for comfort, including the preference for sweet, fattening foods and palatable food^{6,14,23,30}. This psychological aspect implies that eating is a compensation, a reward, or a distracter to avoid emotions that would be painful or unpleasant to experience fully^{22,31}, and that a hedonic response strongly depends on the relative proportions of sugars and fat³². Given that emotional eating has been suggested to have its psychological roots in childhood⁷, early intervention is needed to teach parents to avoid using unhealthy food as a reward for any behaviours (e.g. providing ice-cream when the child is having a bad day) that can encourage children to adopt a maladaptive coping skill.

External eating was found to be significantly related to the consumption of sweet foods and junk food based on the correlation analyses. However, external eating was found to be an important predictor of sweet food consumption, although it failed to predict junk food consumption after the demographic variables were controlled. This result seems to be in partial agreement with study by Elfhaget al.²², which

found that external eating is an important explanatory variable for the consumption of sweet foods and soft-drinks. These results can be explained by *externality theory*⁹, which suggests that external eaters consume food in response to aggressive advertising and marketing of sweet foods in the environment. As suggested by Khor³³, Malaysia ranks among the top countries for the availability of sugar and sweeteners. Given this knowledge, intervention efforts should focus on eliminating environments that promote a variety of highly palatable sugar-based foods, which are available almost everywhere in Malaysia.

The current study found restrained eating to be associated with healthy food patterns, as hypothesized (*Hypothesis 2*). The current findings are also consistent with previous reports²¹, in that restrained eating was associated with more fruit and vegetable consumption in adults. As reported by others^{20, 34}, high restrainers reported a preference for healthy foods, including fruits and vegetables and reduced-fat foods. The current study is consistent with the *restraint theory*, such that restrained individuals are motivated to eat healthy foods and limit their daily intake of food through self-control processes. Although such results suggest the beneficial effects of restrained eating, they are inconsistent with the above findings that restrained eating was more prevalent among those with higher BMIs. *Restraint theory* provides an explanation for the findings. Although obese people score higher on dieting and on concern about diet³⁵, skipping meals might lead to irregular eating patterns, and intense dieting might result in persistent hunger. When self-control of dieting behaviour is undermined, excessive food intake occurs, and eventually, weight gain¹⁵. Empirical studies have found that restrained eaters are more likely to overeat and have food cravings¹⁴ due to the rewarding properties of food³⁶. It may also be the case that individuals with high restraint scores were found to have a tendency to overeat in the presence of emotional distress²⁵. Greeno and Wing³⁷ found that overweight individuals were more likely to use eating as an emotional defense to cope with stress. Hence, it would be beneficial for future research to test whether the impact of restrained eating varies by psychological factors, such as high versus low stress.

The limitations of this study should be noted. The first limitation is the data are cross-sectional, and no causal inferences from the results can be drawn. Second, sampling bias, due to nature of non-probability sampling, may limit the generalisability of the findings. Future studies should use large scale, representative sampling procedures with a more diverse sample. Third, food intake was measured according to the consumption of food

types; the amount of food and energy intake was not measured. Therefore, conclusions about nutrient intake cannot be made. Future studies should explore eating styles and food patterns using longitudinal research designs, daily diaries, and more precise measures of food intake.

CONCLUSION

This study contributes to the understanding of individual differences in healthy and unhealthy eating patterns and food consumption, explaining, in part, an increased susceptibility to weight gain and the associated health implications in some individuals. Future research should explore whether eating style mediates the relationships between food consumption and the risk of having a NCD and being overweight. Hence, acknowledging individuals' eating styles has implications for tailoring effective nutritional programs to address obesity and the epidemic of chronic diseases. Specifically, increasing individuals' adherence to dietary programs is a major challenge for public health intervention; therefore, targeting individuals' eating styles should increase the efficacy of weight-loss and health-intervention programs¹⁴.

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