

## Summary

# Are Palatable Eating Motives A Risk Factor for Binge Eating Disorder?

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Nutrition, defined as the intake of necessary nutrients for individuals to grow, develop, and sustain their lives in a healthy and productive way, is a continuous behavior that requires conscious effort to protect and improve health, while also enhancing the quality of life (Republic of Turkey Ministry of Health, 2023). Although obesity is the first disease that comes to mind when it comes to food consumption, eating disorders are also important diseases associated with unhealthy patterns of eating behaviors. The most common eating disorder, known as Binge Eating Disorder (BED), typically manifests in late adolescence or early adulthood, influencing the social, physical, and psychological development of adolescents (Badrasawi & Zidan, 2019). The BED is defined as the inability of the individual to restrain eating behavior, accompanied by intense embarrassment, disgust, or shame stress, occurring in the absence of any compensatory behavior (vomiting, etc.), eating more food than most individuals can eat in a certain time, under similar conditions and duration (Gordon, Brockmeyer, Schmidt, & Campbell, 2019; Turan, Poyraz, & Özdemir, 2015). Albert Stunkard first mentioned the BED in 1959, and the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5) included it in the category of eating disorders (APA, 2013).

Eating disorders are life-threatening chronic diseases with high morbidity and mortality rates that start with inadequate or excessive food intake and then cause permanent disturbances in eating attitudes and behaviors (APA, 2013). In addition to the unfavorable clinical picture, success rates in the treatment of eating disorders are also low (Fairburn & Harrison, 2003). Smink et al. (2013) reported that the five-year recovery rates of anorexia nervosa (AN) and bulimia nervosa (BN) were 69% and 55%, respectively. Moreover, eating disorders have the highest mortality rate among all psychiatric disorders

(Arcelus et al., 2011). Considering that prevention is the best form of treatment, it is important to identify the cognitive and behavioral factors associated with binge eating. Eating behavior is a combination of many factors that affect individuals' health and nutrition (Marcone, Madan, & Grodzinski, 2020). Eating motivations are factors that direct individuals' eating behaviors and food choices. Given the correlation between eating motivations and healthy eating behaviors, it's crucial to comprehend the reasons behind the consumption of certain foods (Sproesser et al., 2018). Individuals are not always aware of the motivations behind their behavior, and being aware of these motivations is often the first step to changing behavior (Boggiano et al., 2014). Based on this focus, the *Palatable Eating Motives Scale (PEMS)* was developed. Highly palatable foods and beverages are dense in terms of energy content, as well as high sugar and fat content, but they are quite inadequate in terms of nutritional quality. The habit of consuming such foods, especially outside of hunger or metabolic need, is characteristic of binge eating disorders (And et al., 2018; Witt & Lowe, 2014). This scale defines social, coping, reward enhancement, and convenience motivations for eating palatable foods without hunger (Boggiano et al., 2015a; Boggiano et al., 2015b). To prevent eating behavior disorders, it is important to identify individuals' palatable eating behaviors in advance through this scale.

As university students go to university, significant changes occur in their expectations and life demands due to both their adaptation to university life and the effects of adolescence. Along with these changes in students' lifestyles, there are also changes in their eating habits, which may even lead to eating disorders. Students who perceive themselves as overweight, have prejudices against being overweight, and have positive or negative thoughts about being overweight may develop negative

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behaviors, such as avoiding some food groups or giving weight to some of them (Türkmen & Karaca Sivrikaya, 2020). Since university students are particularly vulnerable to unhealthy eating and are at the typical age of onset of BED, it is important to determine the relationship between their motivation to eat deliciously and the risk of BED. However, the number of studies in the literature revealing this relationship is quite limited (And et al., 2018; Boggiano, 2016; Tokis Bayramoğlu, Turna, & Horoz, 2020). Considering all these, the current study aimed to determine the relationship between university students' motivations to consume palatable food and beverages and their binge eating behaviors. In line with this purpose, the hypothesis that motivations for palatable eating would lead to an increase in BED symptoms and severity was tested.

### Method

This descriptive study included 1631 volunteer students between the ages of 19 and 25, with a body mass index (BMI)  $>18 \text{ kg/m}^2$ , who were studying in all fields at universities in Kayseri province and who agreed to participate. The study excluded students with food allergies, chronic diseases that may affect food intake, dietary restrictions, and pregnant and lactating women. Furthermore, the statistical analyses excluded 198 questionnaires due to missing data. We calculated the power analysis for sample size using the G\*Power (version 3.1) statistical program. The sample size of 1433 participants provided 99.9% power at the  $\alpha=.05$  level for the relationship between motivations for palatable eating and binge eating disorder obtained by logistic regression analysis. Before starting the study, permission was obtained from the Erciyes University Social and Human Sciences Ethics Committee. Afterwards, the participants were informed about the research in accordance with the Declaration of Helsinki, and those who volunteered to participate in the study read and signed the informed consent form.

To realize the objectives of the study, the researchers administered a face-to-face questionnaire consisting of three sections (a short personal information form and two different scales) to the participants as a data collection tool, which took approximately 15 minutes to administer. The short information form asked about anthropometric and demographic characteristics such as age, gender, body weight, height, university, department, and grade level of education. The first scale used as a data collection tool is the PEMS, which assesses individuals' consumption of palatable food and beverages. The second one is the *Bulimic Investigatory Test Edinburgh (BITE)*, which assesses the binge eating status of the

participants. We calculated the participants' BMI values using their declared height and weight, then classified them using the World Health Organization's (WHO) classification (WHO, 1997).

Developed by Boggiano (2016) and validated in Turkish by And et al. (2018), the PEMS consists of 20 questions that assess individuals' frequency of consuming palatable food and beverages and offers four different "motives". This scale identifies coping, reward enhancement, social, and convenience motivations for eating palatable foods without hunger. The questions are rated on a 5-point Likert scale (1 = *never or almost never*; 5 = *almost always or always*). Scores for each motivation are calculated by averaging the responses to the questions that include that motivation. The total score for the PEMS is the sum of these mean scores and reflects the overall intake of palatable foods for non-metabolic reasons.

And et al. (2018) conducted a study where they found that coping and conformity motivations could predict the risk of binge eating, and that coping motivation could also predict higher BMI, particularly in individuals with more eating disorders. The study's Cronbach Alpha values for these motivations were coping .90, reward enhancement .86, social .81, and conformity .86 (And et al., 2018). In this study, the Cronbach's Alpha values for the PEMS motivations were calculated as follows: coping .89, reward enhancement .86, social .80, and convenience .75, all of which were found to be acceptable.

Henderson and Freeman (1987) developed the BITE, a self-report tool, and Kiran et al. (2000) reliably validated it in Turkish to assess the participants' binge eating patterns. This scale, which consists of 33 questions measuring symptoms of bulimia neurosis or binge eating, has two subscales: the "symptom scale" and the "severity scale". The "symptom scale" comprises the first 30 questions, which respondents answer with a yes or no response, resulting in the highest score of 30. A symptom score in the range of 0–9 is considered "low," i.e., no binge eating disorder or abnormal eating behavior; a symptom score in the range of 10–19 is considered "moderate," i.e., no binge eating disorder but abnormal eating behavior; and a score of 20 and above is considered "high," i.e., the presence of binge eating disorder. The "severity scale" consists of three questions. A severity score of 5 and above is considered "clinically significant," and a score of 10 and above is considered "severe." The Turkish validity and reliability study reported a Cronbach's Alpha internal consistency coefficient of .84 for the scale (Kiran ve ark., 2000). This study calculated the Cronbach's Alpha value of the BITE scale as 0.77 and found it to be at an acceptable level.

The IBM SPSS Statistics (version 27.0, USA, IBM

Corp.) statistical package program evaluated the data obtained from the study. We presented summary statistics as number (n) and percentage (%) for categorical variables, mean (mean) and standard deviation (SD) for numerical variables. We evaluated the conformity of the numerical variables to a normal distribution using histograms, q-q graphs, and the Kolmogorov-Smirnov test, concluding that the data exhibited a normal distribution. We used the T-test for independent groups and one-way analysis of variance (ANOVA) for numerical variables, and the chi-square test for categorical variables. We also used logistic regression analysis to investigate whether palatable eating motives were a risk factor for binge eating disorder, and we created different models by adjusting for age, gender, and BMI, which were considered potential confounding risk factors. In this analysis, the dependent variable was “high” for the BED symptom scale and “clinically significant or severe” for the severity scale, while the independent variables were motivations to eat deliciously. In all statistical analyses, the confidence interval was 95%, and the significance level was accepted as  $p < .05$ .

## Results

This study was completed with 1433 participants aged 18-25 years. The average age of the participants was  $21.13 \pm 1.77$  years and 78.6% were female. Of the students participating in the study, 23.2% were studying in the field of health sciences, 36.5% in the field of science, 36.8% in the field of social sciences, and 3.5% in vocational schools. When the anthropometric measurements of the participants were analyzed, it was found that males had higher age, body weight and height than females ( $t = 5.09$ ,  $p < .001$  for age;  $t = 25.8$ ,  $p < .001$  for weight;  $t = 36.79$ ,  $p < .001$  for height). 84.6% of women and 75.8% of men were of normal weight and the difference between the groups was statistically significant ( $\chi^2 = 20.53$ ,  $p < .001$ ).

According to the BITE symptom classification, 46.3% of the participants were in the “moderate” and 3.2% in the “high” group, while 12.7% were in the “clinically significant or severe” group according to the BITE severity scale classification. When the BITE symptom and severity distributions by gender were analyzed, it was found that more than half of the men (57.2%) were in the “low” symptom group, while the proportions of women in the “low” and “moderate” symptom groups were similar ( $\chi^2 = 9.01$ ,  $p = .011$ ). The rate of women in the “high” symptom group (3.6%) was higher than that of men (1.6%) ( $\chi^2 = 9.01$ ,  $p = .011$ ). There was no statistically significant difference between genders according to severity classification ( $\chi^2 = .13$ ,  $p > .05$ ). When the BITE

symptom and severity distributions of the participants according to BMI classification were examined, it was observed that those with underweight and normal body weight were in the “low” symptom group with rates of 65.2% and 52.8%, respectively, while those with mild obesity and obese body weight were in the “moderate” symptom group with rates of 52.0% and 81.0%, respectively ( $\chi^2 = 60.11$ ,  $p < .001$ ). The BITE severity distribution of the groups did not show a statistically significant difference ( $\chi^2 = 8.79$ ,  $p > .05$ ).

The participants’ PEMS “social” score was found to be  $M = 2.29$ ,  $SD = 0.90$ , “coping” score was found to be  $M = 2.23$ ,  $SD = 0.95$ , “reward enhancement” score was found to be  $M = 2.49$ ,  $SD = 0.98$ , “conformity” score was found to be  $M = 1.28$ ,  $SD = 0.40$  and total scale score was found to be  $M = 8.30$ ,  $SD = 2.50$ . While the mean total score and subscale scores of the PEMS did not vary according to BMI classification ( $p > .05$ ); when evaluated according to gender, the “coping” score was found to be higher in women ( $M = 2.31$ ,  $SD = 0.96$ ) than in men ( $M = 2.31$ ,  $SD = 0.98$ ) were significantly higher in females ( $M = 2.31$ ,  $SD = 0.96$ ) than in males ( $M = 1.94$ ,  $SD = 0.87$ ) ( $t = -6.093$ ,  $p = .008$ ), and the “compliance” score was significantly higher in males ( $M = 1.37$ ,  $SD = 0.49$ ) than in females ( $M = 1.25$ ,  $SD = 0.37$ ) ( $t = 4.641$ ,  $p = .001$ ).

When the distribution of PEMS scores of the participants according to BITE symptom classification was evaluated, it was observed that all mean PEMS subscale scores and total scale scores increased from low to high in BITE symptom classification ( $p < .001$ ). According to the BITE severity classification, it was observed that the PEMS total score and all subscale scores increased from normal to clinically significant or severe severity on the BITE severity scale ( $t = -4.45$ ,  $p < .001$  for “social”;  $t = -5.11$ ,  $p < .001$  for “coping”;  $t = -4.90$ ,  $p = .017$  for “reward enhancement”;  $t = -2.78$ ,  $p < .001$  for “convenience”;  $t = -5.96$ ,  $p < .001$  for total scale score).

Different logistic regression models were constructed to determine the relationship between the subscale and total scores of motivations for palatable eating and BITE symptom and severity scales, taking into account potential confounding factors such as age, gender and BMI. In the final model (Model 3), which adjusted for all confounding factors, a 1-point increase in the “social” subscale of the PEMS resulted in a 2.6-fold increase in the risk of having BITE symptoms and a 1.4-fold increase in the risk of BITE severity being clinically significant. A 1-point increase in the “coping” subscale of the PEMS was associated with a 3.6-fold increase in the risk of symptoms and a 1.5-fold increase in the risk of being clinically significant. A 1-point increase in the PEMS “reward enhancement” subscale is associated with a 2.9-fold increase in the risk of symptoms and a

1.4-fold increase in the risk of being clinically important. A 1-point increase in the “*appropriateness*” subscale of the PEMS is associated with a 3.1-fold increase in symptom risk and a 1.6-fold increase in the risk of clinical severity. Finally, a 1-unit increase in the total scale score was associated with a 1.6-fold increase in the risk of having symptoms and a 1.2-fold increase in the risk of being clinically significant ( $p < .001$ ).

### Discussion

We conducted this study to investigate the relationship between university students’ motivations for eating palatable foods and binge eating behaviors, and to identify the specific motivations associated with the risk of BED. The study revealed a correlation between participants’ elevated PEMS scores across all subscales and total scores and a higher likelihood of BED symptoms and severity. We believe these findings will contribute to the literature and potentially lead to clinical studies, given the importance of identifying possible risk factors in advance to prevent BED. Binge eating disorder is common among university students (Tokis Bayramoğlu et al., 2020). In previous studies, the prevalence of symptoms of BED varied between 2.8 and 12.58 percent (Arslan & Alataş, 2023; Tokis Bayramoğlu et al., 2020; Chang et al., 2015). This study also found a prevalence of 3.2% for BED. A general evaluation of the literature reveals that factors such as coping with the stress of leaving their families and environment for education, adapting to university life, and the effects of adolescence contribute to the prevalence of BED in university students. Research indicates that women and those with a higher BMI are more likely to experience BED (Arslan & Alataş, 2023; Erol, Toprak, & Yazıcı, 2006; Tokis Bayramoğlu et al., 2020). Similarly, this study found higher rates of BED in women who were slightly obese or fat. This suggests that the emphasis on women’s physical appearance for social success may be a risk factor for BED development (Kugu, Akyuz, Dogan, Ersan, & Izgic, 2006).

The PEMS identifies four different motivations for eating palatable foods other than hunger: “*social*,” “*coping*,” “*reward enhancement*,” and “*convenience*.” “*Social*” motivations refer to the act of consuming tasty food or drink for social purposes, such as enhancing social interactions, relishing friend gatherings, and celebrating special occasions. “*Coping*” motivations involve consuming tasty foods to overcome negative emotions (anxiety, depression, irritability, bad mood, forgetting about problems, etc.). “*Reward enhancement*” motivations relate to consuming tasty foods or drinks to enhance positive experiences or feelings (e.g., because it is fun or because the person likes the feeling). Finally, “*confor-*

*mit*” motivations are associated with the consumption of palatable foods due to environmental pressures (to fit in, to be liked, or not to feel excluded) (Burgess et al., 2014). When different studies conducted with university students were examined, it was seen that the “*social*” score for these motivations ranged between 2.06-2.32, the “*coping*” rating ranged between 1.74-1.91, the “*reward improvement*” rating ranged between 1.90-2.05, the “*convenience*” rating ranged between 1.38-1.63, and the total scale score ranged between 7.29-7.63. (Boggiano et al., 2014; Boggiano, 2016; Taş & Gezer, 2022). This study found the mean scores from the PEMS motivations to be like those in the literature. Some studies have demonstrated a relationship between BMI and gender and the motivations driving individuals’ consumption of palatable food and beverages, as determined by the PEMS (And et al., 2018; Burgess et al., 2014; Boggiano et al., 2014; Boggiano, 2016; Boggiano et al., 2017; Taş & Gezer, 2022), while others have found no such relationship (Taş & Gezer, 2022). The present study observed no effect of BMI on the total and subscale scores of the PEMS, revealing a higher “*coping*” motivation in women compared to men. This higher motivation in women may be associated with hormonal differences in energy intake and body weight regulation that vary according to gender. Studies reveal that women exhibit more reactive and sensitive neural responses to images of palatable foods than men, primarily due to the influence of the estrogen hormone (Cornier, Salberg, Endly, Bessesen, & Tregellas, 2010; Novelle & Diéguez, 2019).

It is very important to determine the cognitive and behavioral factors associated with binge eating in the prevention of disorders characterized by BED, which have a lifelong chronic course and no permanent treatment. Currently, researchers believe that identifying motivations through PEMS could serve as significant mediators in preventing BED. The number of studies that investigated the relationship between PEMS and BED in university students and conducted logistic regression analysis to evaluate whether motivations for palatable eating are a risk factor for BED is quite limited (And et al., 2018; Burgess et al., 2014; Boggiano et al., 2014; Boggiano, 2016). According to the study’s findings, mostly “*coping*” motivation was associated with higher BED scores (Boggiano et al., 2014; Burgess et al., 2014). This study calculated odds ratios using logistic regression models, revealing that all motivations for palatable eating may be risk factors for BED. In the present study, we found that “*reward enhancement*” and “*coping*” motivations, both intrinsically driven reasons for eating palatable foods, were associated with increased BED scores, despite other studies finding only “*coping*” motivation to be associated with BED. Furthermore, the

association between “social” and “convenience” motivations, which are externally driven eating reasons, and higher BED scores could potentially stem from the greater influence of family and friends on food choices in Turkish culture rather than individuality. On the other hand, unlike previous studies, the large sample size in the current study, as well as the consideration of potential confounding factors that may affect the findings, may have provided a clearer and more reliable presentation of the results. These findings suggest that motivations for palatable eating may help predict the risk of BED.

The current study has some strengths, such as having a large participant population and assessing both genders. Additionally, we adjusted for potential confounding factors like age, gender, and BMI in this study and calculated odds ratios to clearly identify the relationship between motivations to eat deliciously and BED. One of the strengths of this study is that the participants were university students from all fields (health sciences, sciences, social sciences, and vocational schools), not just students from a specific department or faculty. However, the present study has some limitations. The first limitation stems from the self-reported nature of the participants’ anthropometric measurements. However, various epidemiologic studies have proven the satisfactory accuracy of self-reported body weight and height data (Ruzanska & Warschburger, 2019; Spencer, Appleby, Davey, & Key, 2002). The study also lacks a measurement tool to assess conditions like anxiety and depression, which could influence eating motivations. The study’s final limitation is that it exclusively involved students from Kayseri’s universities. This situation hinders the dissemination of the data obtained throughout the country due to its predominantly regional nature. However, given the large number of participants and the diverse geographical origins of university students, we can consider the data from this study to be a representative sample.

In conclusion, it is important to identify the primary motivations behind university students’ consumption of tasty food and beverages. However, an even more important finding is that this study concluded that a one-unit increase in all PEMS subscales and total scores was associated with an increased risk of BED. While the findings obtained in this study provide insight into the disturbed eating patterns observed in university students, they may lead to future clinical studies to evaluate the predictive power of the PEMS in the development of clinical disorders. This scale can be used to not only predict but also help prevent eating disorders in young adults and university students. It can help clinicians plan treatment for targeted motivation, as it identifies an individual’s primary motivation for consuming palatable

foods and beverages and identifies the conditions in which they are most vulnerable to eating. Additionally, utilizing the PEMS to understand why individuals with eating disorders consume palatable foods and beverages could potentially reduce the number of remissions that negatively impact cognitive-behavioral treatment processes and aid in problem-solving. The motivations underlying the consumption of palatable food are highly heterogeneous, and knowing individuals’ dominant motivation for consuming palatable food may help to promote healthier food and beverage choices at times and places where they are most vulnerable.