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BODY MASS INDEX IN WOMEN IS RELATED TO EATING BEHAVIOUR, ADDICTIVE EATING AND DEPRESSION

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Abstract: The purpose of this study was to examine the eating behaviour, food addiction and depression status in women with different body mass indexes. Participants included 951 adult women whose BMI ranged from 14.9 kg/m^2 to 55.8 kg/m^2. In the study, general characteristics of the participants and their eating habits were asked, their anthropometric measurements were requested, and the "Dutch Eating Behaviour Questionnaire (DEBQ)", "Addiction-Like Eating Behaviour Scale (AEBS)" and "Beck Depression Inventory (BDI)" questions were asked. It was determined that the mean age of the participants was 31.4±7.7 years, and the body mass index of 53.0% was within the normal range. 86.6% of the participants stated that their emotional state affects their eating habits. A statistically significant correlation was determined between the DEBQ and its subscales, AEBS and BDI scores of BMI classes ($F_{(4,914)}$=13.043; 36.234; 5.386; 36.505; 31.070; 15.388, P<0.05). Emotional eating is seen as a mediator between BMI and depression, and it can be said that depressive symptoms are associated with obesity. Individuals with obesity have higher BMI with more depressive symptoms and emotional eating behaviour. The need for multidisciplinary intervention in the treatment of obesity is revealed.

Keywords: Obesity, Emotional eating, Addiction-like eating, Eating disorders, Depression, Women

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1. Introduction

The worldwide prevalence of overweight and obesity has tripled since 1975 (WHO 2018; Roth 2018). However, dramatic increases in the prevalence of obesity are predicted until 2030. Obesity is associated with many medical sequelae diseases associated with premature death, such as cardiovascular diseases, type 2 diabetes, hypertension, various cancers, osteoarthritis and stroke, as well as negative psychosocial relationships such as psychiatric comorbidities, suicidal thought and weight-based stigma. (Hagan et al., 2020). Obesity, which is an illness that can negatively affect almost all physiological functions of the human body, has been stated by WHO as a serious public health problem and a global epidemic (WHO, 2000). However, many organizations, including the World Obesity Federation and the American and Canadian Medical Associations, have declared obesity as a chronic progressive disease rather than just a risk factor for other diseases (Bray et al., 2017). WHO accepts that healthy nutrition and increased physical activity in the whole population should be supported by policies and actions applied in societies (WHO, 2018). While the disease burden of obesity is substantial, the long-term effectiveness of current interventions is complex. Behaviour body weight management interventions require continuous monitoring of the individual's food consumption to achieve meaningful long-term weight loss (Hagan et al., 2020).

Emotions are an integral part of people's daily lives. They not only shape our cognitions, but also lead to many physiological changes and are an essencial motivation for behaviour (Evers et al., 2018). It is stated that different emotions affect eating differently (Nolan et al., 2010). Individuals eat in response to hedonic, social, emotional, and situational triggers. The tendency to eat in response to all positive and negative emotions is called "emotional eating." It has been reported that emotional eating behaviour is observed in obese individuals (Péneau et al., 2013), individuals with eating disorders (Ricca et al., 2009), and individuals who have a normal weight diet (Koenders and Van Strien, 2011). Along with the increasing prevalence of obesity, it has been reported that emotional eating has increased significantly in the last 25 years (Wong et al., 2020). It has been reported that approximately half (57.3%) of overweight/obese adults have high levels of emotional eating (Péneau et al., 2013). There are various theories about why obese individuals resort to emotional eating, and these theories are based on emotional components (Nolan et al., 2010). Eating behaviour, which is related to emotion, affects the

desire for food and the amount and type of food to be consumed with the effect of internal and external factors (Evers et al., 2018). It has been revealed that developing self-regulation skills in order to reduce unhealthy eating behaviour due to emotional eating tendencies, together with exercise support, reduces depressive symptoms. Behaviour obesity interventions are more preferable interventions due to the objectionable health risks of major obesity interventions such as bariatric surgery. With the development of self-regulation skills, early diagnosis and treatment of unhealthy eating behaviour can contribute to the prevention and treatment of obesity (Annesi et al., 2020).

Extrinsic eating is based on the consumption of foods depending on the factors such as taste, visuality and smell, regardless of hunger and satiety. Accordingly, some individuals are more sensitive to the external characteristics of food, and these stimuli are more effective on eating behaviour than physiological signals such as hunger. External factors of food affect obese individuals more than normal weight individuals (Konttinen, 2012). Because obese individuals consider external factors rather than physiological hunger-satiety signals. Even if obese people are not hungry, they are affected by the visual, smell and taste of food (Macht, 2008).

Constraint theory was first discussed by Herman and Mack and later developed by Herman and Polivy. According to this theory, self-restriction of individuals while dieting leads to excessive eating cravings and is associated with weight gain in individuals. According to the theory, when foods are restricted, individuals' passion for that food increases and they struggle to suppress it, and they start consuming other foods more to avoid this food. These individuals may also experience regret, sadness, and anxiety about the foods they have eaten. This is not observed when individuals do not make such a restriction on themselves (Herman and Mack, 1975; Herman and Polivy, 1975).

Food addiction is defined by addiction-like behaviour, such as loss of control over tasty food, which is one of the subsets of disordered eating. Individuals exhibiting disordered eating behaviour increase their food consumption in response to emotional problems. There are studies showing that foods with high carbohydrate and fat content can reduce physiological stress responses produced by the hypothalamic-pituitary-adrenal (HPA) axis. Therefore, it has been suggested that foods with high carbohydrate and fat content can activate dopaminergic reward pathways, and it has been concluded that this may lead to addiction-like behaviour (Mills et al., 2019). It has been reported that emotional eaters consume more sweet and high-fat foods (Camilleri et al., 2014) and snack more frequently in response to stress factors, compared to non-emotional eaters (O'Connor et al., 2008).

In the measurement of attentional bias, the reaction time, eye movements and brain activities of overweight and obese individuals in response to food stimuli are considered (Hagan et al., 2020). He investigated both the effect of visual food cues on brain activation and the effect of the food served on craving ratings. It has been shown that when individuals are shown pictures of delicious, energy-dense foods, the activation of the brain in areas related to reward and attention increases, and the activation resulting from these foods is related to BMI (Thomas et al., 2013). Some results have been revealed that gender also affects the eating tendency (Nolan et al., 2010). Although emotional eating is mostly related to the eating style of women, it has also been revealed that men have a higher tendency to eat in positive emotions and situations than women, and that gender does not influence eating tendency in negative emotions and situations (Lazarevich et al., 2016).

The prevalence of depressive disorder increases every year depending on stress, endocrine dysfunction, diet, and lifestyle. depressive disorders: obesity is a risk factor for cardiovascular diseases and metabolic syndrome. An increase in appetite is among the risk factors seen in depressive disorders, this appetite can be controlled by interfering with the biological and behaviour pathways that cause body weight changes. It has been reported that restrictive behaviour and decreased food intake are associated with depression, and symptoms such as higher emotional eating, increased carbohydrate cravings, and inclination to energy-dense foods in more severe depressive disorders (Mills et al., 2018). Depression increases the risk of weight gain in the individual with changes in appetite and body weight. Weight gain also affects appetite disorders, overeating, and irregularities of appetite hormones (Mills et al., 2019). For this reason, it has been reported that obesity can be both a cause and a result of mood disorders. In a study conducted in young adults, it was reported that depressed individuals are more prone to obesity and emotional eating is a bridge between BMI and depressive symptoms in both men and women (Lazarevich et al., 2016). While some psychological theories explain the relationship between emotional eating and obesity, it has been explained that the effective factor is not only the frequency of eating, but also the amount of portion and the effect of food choice on eating behaviour. Accordingly, it is emphasized that there is no single path between depression and BMI, and that physical activity and behaviour-specific psychological factors significantly affect obesity. It is reported that individuals with emotional eating behaviour have higher BMIs. Although more research is needed on positive emotions, it has been shown correlational that the response to negative emotions contributes to weight gain and obesity. Since these findings are relational, no causality can be established between emotional eating and BMI, but it has been suggested that there is a strong relationship (Lazarevich et al., 2016). Since emotional eating is seen as a mediator between body mass index (BMI) and depression in studies, it can be said that depressive

symptoms are associated with obesity (Nolan et al., 2010).

This study was planned and conducted to examine the relationship between emotional eating, addictive-like eating behaviour and depression in women with normal body weight and obesity.

2. Materials and Methods

2.1. Subject and Procedures

The research was carried out on individuals who voluntarily participated in the study in order to examine the relationship between body mass indexes of adult women and emotional eating, addictive eating behaviour and depression. The study was completed with 951 participants. The research data part was collected using the online survey technique. After the prepared survey form was uploaded to Google Forms, the survey form was delivered to the volunteers that the researchers reached through their individual relationships via social media channels (WhatsApp, Facebook, Twitter, Instagram). Participants filled it with computers or mobile phones in approximately 15 minutes. Electronic consent was obtained from the participants before starting the survey. Women with a body mass index of 30 kg/m^2 and above, who are not pregnant or lactating, and who do not have serious chronic diseases were included in the study. Participants who are younger than 18 or older than 65, those who are in a special period such as pregnancy and lactation, individuals with serious acute illnesses, those with severe psychological disorders, and those who filled in the questionnaire incompletely were excluded from the study. After completing the questionnaires, the file was imported from Google Forms to Excel.

2.2. Instruments

The questionnaire created by the researcher consists of 4 parts. In the questionnaire form, The Dutch Eating Behaviour Questionnaire, the Addictive-Like Eating Behaviour Scale and the Beck Depression Inventory were used.

1. The form containing the demographic information, health information, nutritional habits and anthropometric measurement data of the participants (37 items).
2. Dutch Eating Behaviour Questionnaire (DEBQ) (33 items).
3. Addictive-Like Eating Behaviour Scale (AEBS) (10 item).
4. Beck Depression Inventory (BDI) (22 items).

2.3. Demographic, Health, Nutrition Information and Anthropometric Measurements

In the first part of the questionnaire applied to the individuals who volunteered to participate in the study, age, education level, body weight, height, daytime and night-time sleep duration, information about nutritional habits, daily consumption of water, smoking status, number of daily snacks and meals. related questions were asked.

Height Measurement: Height was taken according to the participants' own statements. The participants, without shoes, with their heels touching the wall, standing upright, looking straight ahead and paying attention to the fact that the head is in the Frankfort plane (eye triangle and top of the auricle are at the same level), using a stadiometer or a non-flexible tape measure, made a survey of the determined height in cm. were asked to enter the relevant place in the form.

2.3.1. Body weight measurement

Body weight will be taken according to the statements of the participants. Body weight measurement is often used as an indicator of nutritional status. Body weight is an indirect indicator of protein mass and energy storage. Attention was paid to ensure that the participants had a minimum of clothing and were weighed as much as possible on an empty stomach. Before using the scale, the participants were asked to weigh 1 kg and confirm the accuracy of the measurement. After the measurement, the body weight was asked to be recorded in the questionnaire.

2.3.2. Body mass index calculation (BMI)

The body mass index of the individuals participating in the study was calculated by dividing the participants' body weight (kg) by the square of their height (m) (BMI=kg/m^2). According to the World Health Organization (WHO), BMI below 18.5 kg/m^2 is classified as underweight, between 18.5-24.9 kg/m^2 as normal, between 25-30 kg/m^2 as overweight, and above 30 kg/m^2 as obese (WHO, 1987).

2.3.3. Dutch eating behaviour questionnaire (DEBQ):

The questionnaire was first developed by Van Strien et al. in 1986 (Van Strien et al., 1986). The Turkish validity and reliability of this scale was done by Bozan in 2009 (Bozan et al., 2009). In this measurement tool, three different eating behaviour were defined as emotional eating, external eating and restrictive eating behaviour, which focus on psychological theories. According to the survey, individuals who overeat uncontrollably in order to cope with negative emotions and to be happy, individuals with "emotional eating attitude", Without physiological hunger, the odor, taste, etc. of the food in the environment. Individuals who consume food due to their characteristics are those who have an "external eating attitude". Restrictive eating attitude, on the other hand, is characterized by the fact that the individual eats less than the amount he wants to eat, while remaining below the saturation limit. DEBQ; It consists of 3 sub-dimensions and 33 items: emotional eating behaviour, external eating behaviour, and restricted eating behaviour. In the emotional eating sub-scale, the effect of the individual's mood (sad, angry, anxious, etc.) on the eating behaviour was found in the external eating sub-scale; regardless of hunger and satiety; It is aimed to determine whether more food is consumed by being affected by external food stimuli such as smell, appearance, and taste, and to what extent the individual avoids food consumption in order to control body weight in the restricted eating

subscale. There are 13 items in the emotional eating behaviour dimension, 10 items in the external eating behaviour dimension, and 10 items in the restricted eating behaviour dimension. The items in the questionnaire are evaluated on a 5-point Likert scale (1-never, 2-rarely, 3-sometimes, 4-often, 5-very often). There is no cut-off point in scoring the questionnaire, the high total score of the three sub-dimensions indicates the negativity related to the eating behaviour. The data of the study related to emotional eating were collected through this scale.

2.3.4. Addiction-like eating behaviour scale (AEBS)

This scale was conducted by Ruddock et al. (Ruddock et al., 2017) to evaluate the addictive-like eating behaviour of individuals. Turkish validation by Demir et al. (Demir et al., 2021). The first 10 items of the scale are presented in a five-point Likert format, and the response options range from "1-Never" to "5-Always". Items 11, 12, 13, 14 and 15 are also presented in a five-point Likert format and response options range from "1-Strongly Disagree" to "5-Strongly Agree". The scoring options of the scale range from 1 ("Never" and "Strongly Agree") to 5 ("Always" and "Strongly Agree") for each statement. Items 6, 11, 12, 13 and 14 are scored in reverse. The whole score and the two subscale scores are calculated by adding these scores. A maximum of 75 points can be obtained from the scale.

2.3.5. Beck depression inventory (BDI)

Beck Depression Inventory was developed by Beck et al. in 1961 (Beck et al., 1961). The Cronbach's alpha coefficient of the scale was found to be 0.87. Its validity and reliability in Turkish were made by Hisli in 1988 and it was adapted to Turkish society (Hisli et al., 1988). Hisli found the Cronbach alpha coefficient to be 0.90. Each item of the scale is related to somatic, emotional, cognitive, and motivational. The scale has four response options [a (0), b (1), c (2), d (3) points] and the scale consists of 21 questions. The maximum score that can be obtained at the end of the scale is 63. A high total score indicates a high level or severity of depression. According to the total score, the level of depression severity is interpreted as "0-9=Minimal, 10-16=Mild, 17-29=Moderate, 30-63=Severe".

2.4. Statistical Analyses

Statistical analyses were performed using SPSS version 24.0®. Frequency tables and descriptive statistics were used to interpret the findings. Kolmogorov-Smirnov analysis was used for the normal distribution test for the scores of the scales and sub-dimensions. The skewness and kurtosis values of the data were checked. The numerical data of the study are normally distributed. Parametric methods were used for the measurement values suitable for normal distribution. "Independent Sample-t" test (t-table value) for comparison of measurement values of two independent groups in accordance with parametric methods; The "ANOVA" test (F-table value) method was used to compare three or more independent groups. LSD and Bonferroni correction were applied for pairwise comparisons of variables with significant difference for three or more groups. The relations between the scales and some variables were determined by Pearson correlation analysis. Interpretations of correlation coefficients r= 0; no relationship, r=0.01-0.29; weak correlation, r=0.3-0.7; moderate correlation, r=0.71-0.99; high correlation, r=1; interpreted with excellent relationship levels. The predictive role of independent variables on dependent variables was tested with multiple regression analysis. Analysis results were interpreted at 95% confidence level and 0.05 significance value for comparison and regression tests, and 0.05 and 0.01 significance values at 95% and 99% confidence levels for correlation tests.

3. Results

The mean age of the participants was 31.4±7.7 (years), 530 participants (55.7%) were married, 810 participants (85.2%) were university graduates, 503 (52.9%) were working, and 494 (51.9%) had a body mass index in the normal range. detected. It was determined that the participants with diagnosed sleep disorders were 22 (2.3%), and the average night-time sleep duration of the participants was 7.2±1.2 hours/day (Table 1).

Table 1. Distribution of findings on participants

Variable (n=951)	n (%)
Age (year)	31.4±7.7
Height (cm)	164.0±5.9
Body weight (kg)	67.7±14.3
Marital Status	
Married	530 (55.7)
Single	421 (44.3)
Educational Status	
≤High school graduated	141 (14.8)
>University graduated	810 (85.2)
Working Status	
Employed	503 (52.9)
Unemployed	448 (47.1)
BMI (kg/m^2)	
<18.5	44 (4.6)
18.5-24.9	494 (51.9)
25-30	265 (27.9)
>30	131 (13.8)
>40	17 (1.8)
Active smoker	196 (20.6)
Diagnosed sleep disorder	22 (2.3)
Average night sleep time (hour/day)	7.2±1.2
Average daytime sleep time (hour/day)	0.3+0.8

Of the 457 participants (48.0%), 193 (20.3%) sometimes skip meals, 395 skip meals due to lack of time, 709 (74.6%) consume snacks after dinner, 460 (48.4%) found their eating speed to be normal and the emotional state of 824 participants (86.6%) affected their eating habits

Table 2. Distribution of findings on participants' eating habits

Variable (n=951)	n (%)
Daily meal count	
1 meal	13 (1.4)
2 meals	457 (48.0)
3 meals	372 (39.1)
4-5 meals	109 (11.5)
Meal Skipping Status	
Skips meals	268 (28.2)
Does not skip meals	490 (51.5)
Sometimes skips meals	193 (20.3)
Reason for Skipping Meals	
Fear of weight gain	102 (10.7)
Lack of time	395 (41.5)
No desire to eat	192 (20.2)
Other	262 (27.6)
After Dinner Snack	
Eat	709 (74.6)
Does not eat	242 (25.4)
Eating Speed	
Fast	373 (39.2)
Normal	460 (48.4)
Slow	118 (12.4)
Emotional state influences eating habits	
Influences	824 (86.6)
Does not influence	127 (13.4)

Table 3 shows the results of the Dutch Eating Behaviour Questionnaire and its sub-dimensions, the Addictive-Like Eating Behaviour Scale and Beck Depression Inventory scores in terms of meal skipping status, and one-way analysis of variance results. According to this, in cases of skipping meals, there was no statistically significant difference in terms of the total score of the DEBQ questionnaire and the first sub-dimension, restrictive eating scores (P>0.05). There is a statistically significant difference in terms of emotional eating scores and external eating scores ($F_{(2948)}$=3.211; P<0.05) ($F_{(2.948)}$=4.812; P<0.05). A statistically significant difference was found in terms of AEBS scores and BDI scores of meal skipping situations ($F_{(2,948)}$=7.679; 16.161; P<0.05). According to the t test results in terms of working status of DEBQ, AEBS and BDI scores; Statistically significant difference was found between the scales of employment status only in terms of BDI scores ($t_{(949)}$=-4.284; P<0.05). One-way analysis of variance results of participants' DEBQ, AEBS and BDI scores in terms of BMI classes are included. According to this; A statistically significant correlation was found between the DEBQ and subscales of BMI classes, AEBS and BDI scores ($F_{(4.914)}$=13.043; 36.234; 5.386; 36.505; 31.070; 15.388, P<0.05). Table 3 shows the t-test results of the individuals' DEBQ, AEBS and BDI scores in terms of their educational status. According to this; there is a statistically significant difference in terms of the restrictive eating and external eating sub-dimensions of DEBQ ($t_{(949)}$=3.911;-3.502, P<0.05). There was no statistically significant difference between AEBS scores and educational status. A statistically significant difference was found between BDI scores in terms of educational status ($t_{(949)}$=2.197; P<0.05).

Table 4 examines the relationship between individuals' DEBQ and its sub-dimensions, AEBS and BDI scores, and variables of age, BMI, average night-time sleep time, and average daytime sleep time. A positive, weak, statistically significant relationship was found between age and the restrictive eating sub-dimension (r=0.215; p=0.000). A negative, weak, statistically significant relationship was found between age and external eating sub-dimension (r=-0.115; p=0.000). A positive, weak, statistically significant relationship was found between age and DEBQ total score (r=0.063; p=0.052). Similarly, a weak statistically significant correlation was found between age and BMI (r=0.266; p=0.000). A positive, weak, statistically significant relationship was found between BMI and restrictive eating, emotional eating, external eating, and DEBQ total score (r=0.134; r=0.369; r=0.125; r=0.358, p=0.000). Similarly, a weak statistically significant correlation was found between BMI and AEBS and BDI scores (r=0.332; r=0.225 p=0.000). Increasing BMI will increase scale scores. A negative, weak, statistically significant relationship was found between mean night sleep duration and BDI (r=-0.082; p=0.006). The BDI score decreases as the average night sleep time increases. Similarly, a negative, weak, statistically significant relationship was found between mean night sleep duration and age (r=0.164; p=0.000). Average night-time sleep time decreases with age. A positive, weak, statistically significant relationship was found between mean daytime sleep duration and AEBS scores (r=0.064; p=0.024). As the average daytime sleep time increases, the AEBS score increases. A negative, weak, statistically significant relationship was found between mean daytime sleep duration and age (r=-0.058; p=0.038). Average daytime sleep time decreases with age.

In Table 5, the predictive role of individuals' DEBQ, AEBS and BDI scores on BMI is examined. 15.8% of the total change in BMI is explained by DEBQ, AEBS and BDI scores (r^2=0.158). A one-unit change in DEBQ causes a 0.058 change in BMI, a one-unit change in AEBS score causes a 0.103 change in BMI, and a one-unit change in BDI scores causes a 0.047 change in BMI. Individual effects of independent variables on BMI were statistically significant (P<0.05). The established regression model was statistically significant ($F_{(3.947)}$=60.378, P<0.05). Individuals' DEBQ, AEBS and BDI scores together have a statistically significant predictive role on BMI.

Table 3. Comparison of Dutch Eating Behavior Questionnaire, Addictive-Like Eating Behavior Scale and Beck Depression Inventory scores according to the findings.

		Dutch Eating Behavior Questionnaire (DEBQ)																					
		DEBQ Sub-Dimensions												DEBQ Total				Addictive-Like Eating Behavior Scale (AEBS)				Beck Depression Inventory (BDI)			
		Restrictive Eating				Emotional Eating				Extrinsic Eating															
		X̄	SD	Analysis	P	X̄	SD	Analysis	P	X̄	SD	Analysis	P	X̄	SD	Analysis	P	X̄	SD	Analysis	P	X̄	SD	Analysis	p
Body Mass Index (kg/m²)	<18.5	20.91	8.67	F=13.043	0.000* (1-2.3.4.5) (2.3)	24.86	10.52	F=36.234	0.000* (1-2.3.4.5) (2-3.4.5) (3-4)	30.21	6.09	F=5.386	0.000* (1-5) (2-3.4.5) (4-5)	75.98	18.11	F=36.505	0.000* (1-2.3.4.5) (2-3.4.5)	36.91	6.19	F=31.070	0.000* (1-2.3.4.5) (2-3.4.5) (3-4.5)	14.76	10.79	F=15.388	0.000* (1-4) (2-3.4) (3-4)
	18.5-24.9	27.67	7.70			32.68	14.26			30.40	6.20			90.75	20.23			39.75	7.39			12.76	8.66		
	25-29.5	29.73	6.49			40.81	15.15			31.96	6.61			102.50	19.42			43.89	8.53			16.11	9.57		
	>30	27.99	7.91			45.65	15.23			32.09	6.97			105.74	19.58			46.50	8.97			19.33	11.25		
	>40	28.53	6.97			48.35	13.60			35.41	7.49			112.29	16.90			49.18	10.47			19.24	5.95		
Educational Status	≤ High School Graduated	30.00	6.42	t=-3.991	0.000*	36.21	15.48	t=-0.435	0.664	29.41	6.90	t=-3.502	0.000*	95.62	19.65	t=-0.144	0.885	41.67	8.77	t=-0.413	0.679	16.57	9.05	t=2.197	0.028*
	>University Graduated	27.58	7.76			36.83	15.55			31.49	6.43			95.90	21.46			42.00	8.47			14.62	9.86		
Meal Skipping Status	Sometimes skips meals	27.85	7.28	F=0.388	0.678	37.23	14.58	F=3.211	0.041* (1.2) (2.3)	31.67	6.17	F=4.812	0.008* (1.2)	96.75	20.09	F=2.946	0.053	42.16	8.17	F=7.679	0.000* (1.2) (2.3)	14.73	9.02	F=16.161	0.000* (1-2.3) (2.3)
	Skips meals	27.81	8.14			37.64	16.86			31.17	6.81			96.62	22.81			43.01	8.99			17.24	11.01		
	Does not skip meals	28.37	7.74			34.24	15.79			29.95	6.96			92.57	21.38			39.94	8.40			12.11	8.96		
Working Status	Employed	27.93	7.34	t=-0.042	0.967	36.99	15.72	t=0.521	0.602	31.24	6.30	t=0.273	0.785	96.16	20.58	t=0.451	0.652	42.16	8.76	t=0.812	0.417	13.64	9.28	t=-4.284	0.000*
	Unemployed	27.95	7.93			36.46	15.33			31.12	6.81			95.53	21.89			41.71	8.24			16.33	10.10		

P<0.05, X̄= mean, SD= standard deviation

*Parametric methods were used for the measurement values suitable for the normal distribution. "Independent Sample-t" test (t-table value) for comparison of measurement values of two independent groups in accordance with parametric methods; The "ANOVA" test (F-table value) method was used to compare three or more independent groups. LSD and Bonferroni correction were applied for pairwise comparisons of variables with significant difference for three or more groups.

Table 4. Examining the relationships between various variables with the Dutch Eating Behaviour Questionnaire, Addictive-Like Eating Behaviour Scale and Beck Depression Inventory (n=951).

		Dutch Eating Behavior Questionnaire (DEBQ)							
		DEBQ Sub-Dimensions			DEBQ Total	AEBS	BDI	Age	BMI
		Restrictive Eating	Emotional Eating	Extrinsic Eating					
Age	r	0.215**	0.029	-0.115**	0.063	-0.084	-0.045	1.000	0.266**
	p	0.000	0.372	0.000	0.052	0.009	0.170		0.000
BMI	r	0.134**	0.369**	0.125	0.358	0.332	0.225**	0.266**	1.000
	p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
ANPT	r	-0.046	-0.028	-0.023	-0.044	-0.020	-0.082**	-0.164**	-0.039
	p	0.077	0.194	0.243	0.087	0.271	0.006	0.000	0.115
ADST	r	-0.027	0.000	0.031	0.000	0.064*	0.050	-0.058*	.069*
	p	0.205	0.499	0.169	0.500	0.024	0.063	0.038	0.017

AEBS= addictive-like eating behavior scale, BDI= beck depression inventory, BMI= body mass index, ANP= average night sleep time, ADST= average daytime sleep time. *P<0.05, **P<0.01.

Table 5. The predictive role of individuals' Dutch Eating Behavior Questionnaire, Addictive-Like Eating Behavior Scale and Beck Depression Inventory scores on body mass index

	Unstandardized Coefficients		Standardized Coefficients	t	p
Model	B	Std. Error	Beta		
(Constant)	14.610	0.849		17.210	0.000
Dutch Eating Behavior Questionnaire	0.058	0.009	0.237	6.559	0.000
Addictive-Like Eating Behavior Scale	0.103	0.022	0.169	4.585	0.000
Beck Depression Inventory	0.047	0.017	0.088	2.725	0.007

r^2= 0,158, $F_{(3,947)}$= 60.378, p=0.001. MI= 14.610+ Ducth Eating Behavior Questionnaire×0,058+Addictive-Like Eating Behavior Scale×0.103+Beck Depression Inventory×0.047. Body mass index was depended variable.

4. Discussion

The sedentary lifestyle and the increasing access to energy-dense foods indicate an obesogenic environment. The most logical solution to obesity is to lose weight and maintain the achieved body weight. However, a study conducted in the USA showed that the proportion of people trying to lose weight who managed to lose 10% of their body weight in more than a year is less than 20%. Therefore, more attention has been paid to the subjective appetite and food choices that are affected after weight loss (Andriessen et al., 2018). Emotional eating and negative emotions create a driving force for unhealthy eating behaviour, and excessive sweet consumption is very common among these unhealthy eating behaviour (Wong et al., 2020). Total daily energy intake was most strongly associated with negative affect (Fong et al., 2019). Therefore, 71% of obese women are trying to change their eating behaviour and lose weight (Annesi et

al., 2020). It has been shown that overweight individuals consume more food in response to negative emotions, thin individuals consume less food, and thin individuals consume more food in response to positive emotions. In this study, 86.6% of the participants stated that their emotional state affected their eating habits (Table 2). In the study, the emotional eating score of those with normal BMI was 32.68±14.26, 40.81±15.15 in those who were overweight, and 45.65±15.23 in those who were obese (Table 3). As the body mass index of the participants' increases, the emotional eating score also increases.

Since the role of psychological factors in the ethology of obesity is undeniable, it has been reported that depression can be both a cause and a result of obesity (Lazarevich et al., 2016). emotional eating: Since it is seen as a mediator between body mass index and depression, it can be said that depressive symptoms are associated with obesity (Nolan et al. 2010). More severe depressive symptoms are associated with higher emotional eating (Van Strien et al., 2016). It is stated that people with positive emotions tend to consume healthier foods, and people with negative emotions tend to consume unhealthy foods (De Young et al., 2014). In a pilot study conducted in 2018, it was emphasized that 25% of individuals with major depressive disorder met the criteria for food addiction, and it was observed at a rate of 5-10% in the general population, while it was observed at a rate of 15-25% in obese individuals (Mills et al., 2019). There is evidence that different emotions affect eating differently (Nolan et al., 2010). When the BDI scores of the participants in this study were examined, the score of those with normal BMI was 12.76±8.66, while it was 16.11±9.57 for those who were overweight and 19.33±11.25 for those who were obese. As the body mass index of women increases, their depression scores also increase (Table 3).

Eating without feeling hungry and a high rate of eating are associated with a lower satiety response and are more common in obese people. While the satiety response and slow rate of eating are negatively associated with obesity, enjoying food and food responsiveness are positively associated with obesity (Croker et al., 2011). In the study, it was determined that women's food addiction is higher than men, and this is because women are more likely to diet than men. Another reason why women have higher food cravings is the menstrual cycle of 32%. High progesterone and estrogen in the mid-luteal phase of the menstrual cycle are associated with emotional eating and food intake (Wong et al., 2020). In this study, it was determined that the food addiction of women increased with the increase in body mass index. While the AEBS score was 39.75±7.39 in those with normal BMI, it was 43.89±8.53 in those who were overweight and 46.50±8.97 in those who were obese (Table 3) height of BMI; associated with a higher depression score. In this study, addiction-like eating behaviour was found to be associated with both high BMI and depression. Similar results are seen in the literature. In a study, when the BMI of the participants and the rates of individuals with obesity or morbid obesity were examined, it was found that those who participated in the survey had an unhealthy diet and also exhibited problematic eating behaviour compared to other individuals. Thus, these results suggest that both unhealthy eating habits and problematic eating behaviour independently increase the likelihood of a person becoming obese or morbidly obese (Heerman et al., 2017).

Emotional eating is associated with overeating as well as unexplored emotional reactivity (Barnhart et al., 2020). In a cross-sectional study (Barnhart et al., 2020), when the relationship of overeating with positive-negative emotional eating and emotional reactivity was examined; factors such as ease of activation, intensity, and duration of negative and positive emotional reactivity.

This study has some limitations. Since this study was conducted only on women, it cannot be attributed to the whole society. At the same time, the presence of different scales evaluating behaviour patterns may cause differences in the interpretation of the study, since it will not give the same results in every study. One of the limitations of the study is that individuals self-declared their body weight and height. It would not be correct to comment on long-term results according to this and other studies in the literature. Further studies examining the longer-term effects are needed.

5. Conclusion and Recommendations

Obesity is a health problem often accompanied by depression and anxiety as well as psychological eating styles such as emotional eating, addictive eating behaviour, and overeating. As a result of the research, it is suggested that obese individuals have higher BMI as they show more depressive symptoms and emotional eating behaviour. Although the studies are relational, a causal link cannot be established, it is emphasized that emotional eating and obesity are strongly related. To weaken these relationships, the need for a multidisciplinary intervention in combination, such as training in self-regulation skills, improving diet quality with dietary changes, psychological, pharmacological and surgical interventions, and raising awareness of the family environment, which has a key role in this process, is revealed. Therefore, it is thought that emotion management should be considered together with a holistic approach in obesity prevention and treatment strategies, because emotional eating is strongly associated with lack of success in weight loss processes. Still, more work is needed to understand individual variability in emotional eating behaviour in response to weight changes.

Author Contributions

Percentages of the author(s) contributions is present below. All authors reviewed and approved final version of the manuscript.

%	P.G.	B.D.E
C	60	40
D	50	50
S	80	20
DCP		100
DAI	100	
L	50	50
W	50	50
CR	50	50
SR	80	20
PM	80	20
FA		

C= concept, D= design, S= supervision, DCP= data collection and/or processing, DAI= data analysis and/or interpretation, L= literature search, W= writing, CR= critical review, SR= submission and revision, PM= project management, FA= funding acquisition.

Conflict of Interest

The authors declared that there is no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

Ethical Approval/Informed Consent

The study adhered to the Declaration of Helsinki protocols (World Medical Association 2008). Before starting the study, permission was obtained from the Non-Interventional Ethics Committee of Ankara Medipol University (approval date: April 04, 2022 and protocol code: 097). All patients signed the free and informed consent form.

References

Andriessen C, Christensen P, Nielsen LV, Ritz C, Astrup A, Larsen TM, Raben A. 2018. Weight loss decreases self-reported appetite and alters food preferences in overweight and obese adults: observational data from the DiOGenes study. Appetite, 125: 314-322.

Annesi JJ, Johnson PH. 2020. Mitigation of the effects of emotional eating on sweets consumption by treatment-associated self-regulatory skills usage in emerging adult and middle-age women with obesity. Appetite, 155: 104818.

Barnhart WR, Braden AL, Jordan, AK. 2020. Negative and positive emotional eating uniquely interact with ease of activation, intensity, and duration of emotional reactivity to predict increased binge eating. Appetite, 151: 104688.

Beck AT, Ward C, Mendelson M, Mock J, Erbaugh J. 1961. Beck depression inventory (BDI). Arch Gen Psychiatry, 4(6): 561-571.

Bozan N, Bas M, Asci FH. 2011. Psychometric properties of Turkish version of Dutch Eating Behavior Questionnaire (DEBQ). A preliminary results. Appetite, 56(3): 564-566.

Bray GA, Kim KK, Wilding JPH, World Obesity Federation. 2017. Obesity: a chronic relapsing progressive disease process. A position statement of the World Obesity Federation. Obes Rev, 18(7): 715-723.

Camilleri GM, Méjean C, Kesse-Guyot E, Andreeva VA, Bellisle F, Hercberg S, Péneau S. 2014. The associations between emotional eating and consumption of energy-dense snack foods are modified by sex and depressive symptomatology. J Nutr, 144(8): 1264-1273.

Croker H, Cooke L, Wardle J. 2011. Appetitive behavior of children attending obesity treatment. Appetite, 57(2): 525-529.

De Young KP, Zander M, Anderson DA. 2014. Beliefs about the emotional consequences of eating and binge eating frequency. Eat Behav, 15(1), 31-36.

Demir D, Bektas M, Demir S, Bektas I. 2021. Psychometric properties of the Turkish version of the addiction-like eating behavior scale for university students. Curr Psychol, 40(6): 2590-2598.

Evers C, Dingemans A, Junghans AF, Boevé A. 2018. Feeling bad or feeling good, does emotion affect your consumption of food? A meta-analysis of the experimental evidence. Neurosci Biobehav Rev, 92, 195-208.

Fong M, Li A, Hill AJ, Cunich M, Skilton MR, Madigan CD, Caterson ID. 2019. Mood and appetite: Their relationship with discretionary and total daily energy intake. Physiol Behav, 207: 122-131.

Hagan KE, Alasmar A, Exum A, Chinn B, Forbush KT. 2020. A systematic review and meta-analysis of attentional bias toward food in individuals with overweight and obesity. Appetite, 151: 104710.

Heerman WJ, Jackson N, Hargreaves M, Mulvaney SA, Schlundt D, Wallston KA. Rothman RL. 2017. Clusters of healthy and unhealthy eating behavior are associated with body mass index among adults. J Nutr Educ Behav, 49(5): 415-421.

Herman CP, Mack D. 1975. Anxiety, restraint, and eating behavior. J Abnorm Psychol, 84(6): 666-672.

Herman CP, Mack D. (1975). Restrained and unrestrained eating. J Pers, 43(4): 647-660.

Hisli N. 1989. A reliability and validity study of Beck Depression Inventory in a university student sample. J Psychol, 7: 3-13.

Koenders PG, and Van Strien T. 2011. Emotional eating, rather than lifestyle behavior, drives weight gain in a prospective study in 1562 employees. J Occup Environ Med, 1287-1293.

Konttinen H. 2012. Dietary habits and obesity: The role of emotional and cognitive factors. Academic Dissertation. URL: https://helda.helsinki.fi/handle/10138/29437 (accessed date: 23 March 2022).

Lazarevich I, Camacho MEI, del Consuelo Velázquez-Alva M, Zepeda MZ. 2016. Relationship among obesity, depression, and emotional eating in young adults. Appetite, 107: 639-644.

Macht M. 2008. How emotions affect eating: A five-way model. Appetite, 50(1): 1-11.

Mills JG, Thomas SJ, Larkin TA, Pai NB, Deng C. 2018. Problematic eating behavior, changes in appetite, and weight gain in Major Depressive Disorder: The role of leptin. J Affec Disord, 240: 137-145.

Mills JG, Larkin TA, Deng C, Thomas SJ. 2019. Weight gain in Major Depressive Disorder: Linking appetite and disordered eating to leptin and ghrelin. Psychiatry Res, 279: 244-251.

Nolan LJ, Halperin LB, Geliebter A. 2010. Emotional Appetite Questionnaire. Construct validity and relationship with BMI. Appetite, 54(2): 314-319.

O'Connor DB, Jones F, Conner, M., McMillan, B., Ferguson, E. (2008). Effects of daily hassles and eating style on eating behavior. Health Psychol, 27(1): 20.

Péneau S, Menard E, Mejean C, Bellisle F, Hercberg S. 2013. Sex and dieting modify the association between emotional eating and weight status. Am J Clin Nutr, 97(6): 1307-1313.

Ricca V, Castellini G, Fioravanti G, Sauro CL, Rotella F, Ravaldi C, Faravelli C. 2012. Emotional eating in anorexia nervosa and bulimia nervosa. Compr Psychiatry, 53(3): 245-251.

Roth GA. 2018. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2017 (GBD 2017) Results. Seattle, United States: Institute for Health Metrics and Evaluation (IHME). Lancet, 392: 1736-1788.

Ruddock HK, Christiansen P, Halford JC, Hardman CA. 2017. The development and validation of the Addiction-like Eating Behavior Scale. Int J Obes, 41(11): 1710-1717.

Thomas EA, Bechtell JL, Vestal BE, Johnson SL, Bessesen DH, Tregellas JR, Cornier MA. 2013. Eating-related behavior and appetite during energy imbalance in obese-prone and obese-resistant individuals. Appetite, 65; 96-102.

Van Strien T, Frijters JE, Bergers GP, Defares PB. 1986. The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. Int J Eat Disord, 5(2); 295-315.

Van Strien T, Konttinen H, Homberg JR, Engels RC, Winkens LH. 2016. Emotional eating as a mediator between depression and weight gain. Appetite, 100; 216-224.

Wong L, Stammers L, Churilov L, Price S, Ekinci E, Sumithran P. 2020. Emotional eating in patients attending a specialist obesity treatment service. Appetite, 151: 104708.

WHO. 1987. Measuring Obesity: Classification and Description of Anthropometric Data: Report on a WHO Consultation on the Epidemiology of Obesity. Warsaw: WHO, 1-22.

WHO. 2018. Noncommunicable diseases country profiles 2018. Obesity and overweight. URL https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight (accessed date: 23 March 2022).

WHO. 2000. Obesity: preventing and managing the global epidemic. Report of a WHO consultation. Geneva: World Health Organization, WHO, 1-22.