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Night-Eating Syndrome, Sleep Quality, and Eating Mindfulness in Psychiatric Outpatients

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ABSTRACT

Introduction: This study aimed to determine eating mindfulness (EM), night eating syndrome (NES), and sleep quality in adult subjects presenting to a psychiatric outpatient clinic and to evaluate possible differences according to diagnoses and clinical variables.

Methods: This study included 381 outpatients. Sociodemographic data were collected, the Night Eating Questionnaire (NEQ), Pittsburgh Sleep Quality Index (PSQI), and the Mindful Eating Questionnaire (MEQ) were completed, and body mass index was measured.

Results: The median PSQI score was 3.0 (0.0-7.0), the median NEQ total score was 4.0 (0.0-14.0), and the median MEQ total score was 76.0 (59.0-95.0). Sixteen percent of the participants met the NES criteria. The patient group with the poorest sleep quality was the group with alcohol/substance use disorder and atypical psychosis. The patient groups with the lowest EM were those with schizophrenia, impulse control disorder, attention deficit disorder, and hyperactivity disorder. The highest NEQ score was found in individuals diagnosed with alcohol/substance use disorder. As the NEQ scores increased, so did the PSQI. A significant negative correlation was found between NEQ and MEQ total, disinhibition, emotional eating, eating control, and focus. The PSQI (β=1.169, $p<0.001$) and the eating control subdimension (β=-0.425, $p=0.003$) predicted the NEQ scale.

Conclusion: NES should not be underestimated in psychiatric outpatient clinics. EM, NES, and sleep quality are closely related. Regarding patients' eating attitudes, sleep problems in psychiatric disorders should also be considered. The eating habits and attitudes of these patients must be carefully examined, and appropriate individuals must be targeted for mindfulness training.

Keywords: Eating behavior, mental disorders, mindful eating, night eating syndrome, sleep quality

Introduction

Night eating syndrome (NES), which is characterized by morning anorexia, evening hyperphagia, and insomnia, is more common than expected in patients presenting to a psychiatric outpatient clinic. Although NES was first described in patients with treatment-resistant obesity, it is also common in non-obese individuals (1). The prevalence of NES is estimated at 1.5% in the general population (2). NES is associated with stress, neuroticism, depression, and anxiety disorders (3-5). The serotonergic system and circadian rhythm disturbances are thought to be responsible for its development (6). Normally, the circadian rhythms of eating and sleep are synchronized. However, in individuals with NES, a phase delay of approximately 2 to 6 hours between eating and sleep rhythms. Food eaten at night disrupts sleep rhythms and can lead to insomnia (difficulty falling asleep and maintaining sleep). This leads to negative mental effects (especially mood and anxiety disorders) and negative metabolic effects. The imbalance between ghrelin and leptin that occurs in these individuals can lead to overeating behaviors (7). Similarly, sleep disorders may affect eating behavior and diet composition, leading to high caloric intake. Eating mindfulness (EM) may be an important factor in the relationship between night eating and sleep.

EM is food-oriented eating by individuals who are aware of their eating habits, mental thoughts, and hunger and satiety signals during eating without being affected by environmental factors. In EM, the person stops the action as soon as they sense a feeling of fullness by noticing internal bodily signals, thus preventing them from eating in situations that encourage them to eat (8). Developing this ability helps people to control their weight and deal with sudden food cravings. It also appears to be effective, especially in improving disordered eating behaviors, such as NES, weight control, and mental health (9).

There is research showing that NES is related to sleep and stress and can affect sleep quality and eating awareness (10). Night eating negatively affects sleep, weight, and metabolism and can cause chronic medical problems, as do inactivity and side effects of psychotropic drugs (6). We

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believe that NES, an eating disorder, and EM are important in psychiatric patients who are vulnerable to the metabolic side effects of psychotropic drugs. NES itself and low EM may result in overweight or obesity and may interfere with psychiatric treatment. A person's sleep quality and NES can be affected by EM. It has been reported that the prevalence of NES among individuals with psychiatric disorders is higher than expected (11). A previous study investigating the prevalence of NES in patients diagnosed with major depressive disorder highlighted the prevalence of this syndrome in relation to psychiatric disorders (12). Recognizing NES and sleep disorders accompanying psychiatric disorders and identifying inappropriate eating habits allows the treatment team to modify their approaches to improve patient adherence to treatment and reduce future complications. The aim of this study was to determine EM, NES, and sleep quality in adult patients presenting to psychiatric outpatient clinics and to evaluate potential differences in these variables according to various psychiatric diagnoses and clinical features. This study was designed to understand how participants differ in terms of psychiatric diagnoses, symptoms, medication use, and other clinical variables. Additionally, this study aimed to comprehend the relationships between EM, NES, and sleep quality and how these variables mutually influence each other. This comprehensive study will be an important step towards a deeper understanding of the effects of psychiatric disorders and sleep problems on eating behaviors.

Methods

Ethical approval for the study was obtained from the Clinical Research Ethics Committee of University of Health Sciences Turkey, İstanbul Training and Research Hospital (approval number: 56, date: 11.02.2022). The study was conducted between March 2022 and June 2022 at the psychiatric outpatient clinic of University of Health Sciences Turkey, İstanbul Training and Research Hospital after ethical approval was granted.

All subjects who presented to the psychiatric outpatient clinic and met the inclusion criteria were included in the study. The presence of psychiatric disorders was determined by a psychiatrist according to the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition. Written informed consent was obtained from all participants, and the sociodemographic data forms, the Night Eating Questionnaire (NEQ), the Pittsburgh Sleep Quality Index (PSQI), and the Mindful Eating Questionnaire (MEQ) were completed for all. After completing the scales, the weight of all participants was measured using a Medisana brand digital scale, height was measured using a tape measure without shoes, and body mass index (BMI) was calculated.

Sample

This study involved 381 outpatients who met the study criteria and presented to the Outpatient Clinic of Psychiatry, University of Health Sciences Turkey, İstanbul Training and Research Hospital. Throughout the study process, 453 individuals were identified; however, those who did not complete the scales were excluded from the study. The inclusion criteria for the participants were as follows: age between 18 and 65 years, no significant physical or neurological pathology preventing completion of the scales, no dementia/cognitive dysfunction, no mental retardation, no known sleep disorders such as narcolepsy, hypersomnia, sleep terrors, and none of the diagnoses eating disorders, and signing of informed consent. There was no control group in the study.

Measures

Sociodemographic Data Form: This semi-structured scale was created by the researchers and asked all participants about age, gender, education status, working status, cigarette, alcohol, and drug use, known chronic diseases, medications taken continuously, diet and exercise, BMI, and known psychiatric treatments.

Night Eating Questionnaire: This questionnaire was developed by Allison et al. (13) and was adapted into Turkish by Atasoy et al. (14). The total score ranged from 0 to 52, and those who scored 30 or more points on the scale were considered at risk. In the validity and reliability study of the Turkish version, the cutoff value was assumed to be 18 points.

Mindful Eating Questionnaire: This questionnaire was developed by Framson et al. (15), and its Turkish validity and reliability were studied by Köse et al. (16). The scale includes seven subdimensions: disinhibition, emotional eating, eating control, focus, eating discipline, mindfulness, and interference. A high value for each subdimension of the scale indicates that the trait associated with that subdimension is high. The lowest score was 30 and the highest score was 150. The higher the score on the scale, the higher the level of EM.

Pittsburgh Sleep Quality Index: The Turkish validity and reliability of the 19-item scale were examined. The total score ranged from 0 to 21, and a score of more than 5 points on the scale indicates poor sleep quality (17).

Statistical Analysis

Analyses were performed using 22 package programs from SPSS (Statistical Package for Social Sciences; SPSS Inc., Chicago, IL). Descriptive data were reported in the study as n and percentage values for categorical data and as mean ± standard deviation and median interquartile range (25-75 percentile values) for continuous data. Chi-square analysis (Pearson's chi-square) was used to compare categorical variables between groups. The conformity of constant variables to the normal distribution was assessed using the Kolmogorov-Smirnov test. The Mann-Whitney U test was used to compare paired groups, and the Kruskal-Wallis test was used to compare more than two variables. The Spearman's correlation test was used to examine the relationship between continuous variables. Linear regression analysis was performed to identify the predictors of the NEQ scale scores. The enter method was used to construct the model. The statistical significance level in the analyses was taken as $p<0.05$.

Results

A total of 381 participants with a mean age of 39.3±14.1 (minimum: 18-maximum: 65) years were included in the study. A total of 65.4% of participants were female and 34.6% were male. A total of 43.6% of participants were single, 56.4% were married, 27.3% had an elementary school degree, 27% had a secondary school degree, and 45.7% had a high school degree. A total of 92.9% of participants had an active psychiatric

disorder and 69.6% were receiving active psychiatric treatment. Thirty-two percent of participants had a family history of psychiatric disorder, 9.2% had a history of self-injurious behavior, 15% had a history of suicide attempts, and 34.1% had a history of additional organic disease.

Forty-two percent of participants reported skipping at least one meal per day (44.4% of the 160 individuals in the morning, 43.8% in the afternoon, and 11.9% in the evening), 35.7% reported consuming junk food between meals, and 52.5% reported engaging in physical activity (with frequencies ranging from daily to three or four times per month). 40.7% of participants had dieted at some point in their lives, and 23.1% of participants had a family member with obesity in their family history. 5.8% of participants reported that they were planning bariatric surgery for themselves (Table 1).

When all participants were examined, the median PSQI score was 3.0 (0.0-7.0), the median NES score was 4.0 (0.0-14.0), and the median MEQ total score was 76.0 (59.0-95.0).

The scale scores by sociodemographic and clinical characteristics are compared in Table 2. To mention only some of them: PSQI ($p<0.001$) and NEQ ($p<0.001$) scores of individuals with active psychiatric disorder were significantly higher than those of individuals without psychiatric disorder, and the MEQ scores ($p=0.015$) were significantly lower. The PSQI ($p<0.001$) and NEQ ($p=0.001$) scores of those who received psychiatric treatment were significantly higher than those of those who did not, and the MEQ scores ($p=0.023$) were significantly lower. The PSQI ($p<0.001$) and NEQ ($p=0.001$) scores of those who skipped meals were significantly higher than those who did not. The PSQI ($p<0.001$) and NEQ ($p<0.001$) scores of those who consumed junk food between meals were significantly higher than those who did not, and the MEQ score ($p=0.04$) was significantly lower. The PSQI score ($p=0.025$) of those who engaged in regular physical activity was significantly lower than that of those who did not, and the MEQ score ($p=0.001$) was significantly higher. The MEQ score of those who had a family member with obesity in their family history was significantly lower than that of those who did not have a family member ($p=0.025$) (Table 2).

The highest PSQI scores were found in those diagnosed with alcohol and drug use disorders and those diagnosed with atypical psychosis. Subjects diagnosed with alcohol and substance use disorder had the highest NEQ score. The lowest MEQ score was observed in individuals diagnosed with schizophrenia, impulse control disorder, and attention deficit and hyperactivity disorder (ADHD) (Table 3).

The results of the correlation analysis are presented in Table 4. Accordingly, there was a positive correlation between BMI and PSQI and NEQ and a negative correlation between BMI and MEQ total, disinhibition, emotional eating, eating control, and focus. A positive correlation was found between PSQI and MEQ and a negative correlation was found between PSQI and MEQ total, disinhibition, emotional eating, eating control, focus, and interference. A significant negative correlation was found between NEQ and MEQ total, disinhibition, emotional eating, eating control, and focus (Table 4).

After multiple linear regression analysis, the PSQI ($\beta=1.169$, $p<0.001$) and the eating control subdimension ($\beta=-0.425$, $p=0.003$) predicted the NEQ scale (Table 5).

Discussion

According to our study results, 34.9% of participants had poor sleep quality when the PSQI cutoff score was 5. It should be noted that 92.9% of the participants had an active psychiatric disorder, and 69.6% were receiving active psychotropic medications, including hypnotic and sedative drugs. The sleep quality of individuals with a psychiatric diagnosis was significantly poorer than that of individuals without such a diagnosis. In addition, those with any diagnosis had lower EM scores and higher NEQ scores. The sleep quality of patients with alcohol and drug use disorders and atypical psychosis was poorer than that of other psychiatric diagnoses. Insomnia is associated with high comorbidity, particularly depression, anxiety disorders, schizophrenia, and alcohol and drug use disorders. NES is often associated with psychiatric comorbidities. Psychiatric disorders trigger the occurrence of NES (1). In a study that included psychotic disorders, 16.5% of patients were diagnosed with NES according to the NEQ (the cut-off point was assumed to be 25) (18). In a study of 175 patients with schizophrenia, NES was found to be 8% associated with poor sleep quality according to the PSQI (19).

In addition to the metabolic side effects of psychotropic drugs, high BMI is an expected outcome in psychiatric patients because it is also associated with EM. The participants were overweight with a mean BMI of 25.6. On the other hand, the EM and sleep quality were lower in those who received psychotropic drugs than in those who did not. We hypothesized that the low EM of drug users may be due to their psychiatric disorders. This is because a psychiatric diagnosis may have a negative impact on eating behavior. There is very little research on this topic. Regardless of psychiatric disorders, treatment with psychotropic drugs can affect sleep-wake cycles. Psychotropic drugs can improve sleep by increasing the activity of systems that provide sleep or improve wakefulness by using vice versa mechanisms. We do not know whether this finding is due to the use of psychotropic drugs, including the use of multiple drugs, or the disease itself.

In our study group, 16% of participants (at 18 cut-off points) met the NES criteria. This rate is consistent with the data reported in the literature. NES occurs in approximately 12.3% of psychiatric patients (20). The NEQ score was highest among patients diagnosed with substance and alcohol use disorders, with a median score of 11 points. It has been noted that people with alcohol/substance use disorders have high rates of eating disorder behaviors due to shared biological and psychological risk factors (21). Both have common denominators, such as impulsivity, compulsive behavior, the tendency to eat to cope with negative emotions, and the tendency to avoid emotions.

The patient groups with the lowest EM were those diagnosed with schizophrenia, impulse control disorders, and ADHD in the present study. EM has been studied primarily in the general population and in individuals with obesity rather than those with eating disorders. Therefore, very few data are available to make a comparison. The risk of developing an eating disorder is almost three times higher in individuals with ADHD than in the general population (22). Mindful eating indicates that the individual chooses and is aware of the appropriate foods and is related to self-efficacy in eating. The ability to be mindful is associated

Table 1. Sociodemographic and clinical characteristics of the participants

		Number	%
Age (years), mean ± SD		39.3±14.1	
BMI, mean ± SD		25.6±4.6	
Gender	Female	249	65.4
	Male	132	34.6
Marital status	Single	166	43.6
	Married	215	56.4
Education status	Elementary school degree	104	27.3
	Secondary school degree	103	27.0
	High school degree	174	45.7
Place of residence	Village-town	65	17.1
	City	316	82.9
Economical status	Below the hunger line	12	3.1
	Below the poverty line	190	49.9
	Above the poverty line	179	47.0
Working status	Working	160	42.0
	Not working	221	58.0
Alcohol/substance use	Yes	40	10.5
	No	341	89.5
Cigarette use	Yes	118	31.0
	No	263	69.0
Active psychiatric disorder	Yes	354	92.9
	No	27	7.1
Status of receiving psychiatric treatment	Yes	265	69.6
	No	116	30.4
A family history of psychiatric disorder	Yes	123	32.3
	No	258	67.7
A history of self-injurious	Yes	35	9.2
	No	346	90.8
A history of suicide attempts	Yes	57	15.0
	No	324	85.0
A history of additional organic disease	Yes	130	34.1
	No	251	65.9
Skipping at least one meal per day	Yes	160	42.0
	No	221	58.0
Consuming junk food between meals	Yes	136	35.7
	No	245	64.3
Engaging in physical activity	Yes	200	52.5
	No	181	47.5
Physical activity pattern	Daily	36	18.0
	3-4 times per week	38	19.0
	1-2 times per week	57	28.5
	1-2 times per month	69	34.5
Dieting effort at some point in their lives	Yes	155	40.7
	No	226	59.3
Having a family member with obesity in their family history	Yes	88	23.1
	No	293	76.9
Planning bariatric surgery for themselves	Yes	22	5.8
	No	359	94.2

BMI: Body mass index, SD: Standard deviation

Table 2. Comparison of scale scores according to sociodemographic and clinical characteristics

		PSQI		NEQ		MEQ	
		Median (IQR)	p	Median (IQR)	p	Median (IQR)	p
Gender	Female	3.0 (0.0-8.0)	**0.021**	4.0 (0.0-14.0)	0.344	77.0 (60.0-95.0)	0.330
	Male	2.0 (0.0-6.0)		3.0 (0.0-11.0)		71.5 (57.0-95.0)	
Marital status	Single	3.0 (0.0-7.0)	0.375	4.0 (0.0-15.0)	0.208	76.0 (57.0-95.0)	0.813
	Married	2.0 (0.0-7.0)		3.0 (0.0-12.0)		76.0 (59.0-94.0)	
Education status	Elementary school degree	3.0 (0.0-7.5)	0.716	3.0 (0.0-12.5)	0.496	80.0 (63.0-97.5)	0.316
	Secondary school degree	3.0 (0.0-8.0)		4.0 (0.0-13.0)		72.0 (57.0-95.0)	
	High school degree	3.0 (0.0-7.0)		4.0 (0.0-15.0)		74.0 (59.0-94.0)	
Place of residence	Village-town	1.0 (0.0-6.0)	0.052	1.0 (0.0-7.0)	**0.004**	70.0 (55.0-93.0)	0.065
	City	3.0 (0.0-8.0)		4.0 (0.0-14.0)		78.0 (60.0-95.0)	
Economical status	Below the hunger line	2.0 (0.0-10.0)	0.814	1.5 (0.0-20.5)	0.834	72.5 (58.5-90.5)[a,b]	**0.037**
	Below the poverty line	3.0 (0.0-7.0)		4.0 (0.0-14.0)		80.0 (64.0-98.0)[a]	
	Above the poverty line	3.0 (0.0-7.0)		3.0 (0.0-12.0)		71.0 (57.0-90.0)[b]	
Working status	Working	2.0 (0.0-6.0)	**0.008**	3.0 (0.0-11.0)	**0.033**	78.0 (63.5-95.5)	0.157
	Not working	3.0 (0.0-8.0)		4.0 (0.0-14.0)		74.0 (57.0-94.0)	
Alcohol/substance use	Yes	1.0 (0.0-5.0)	0.188	3.0 (0.0-14.0)	0.908	67.0 (55.0-88.5)	0.132
	No	3.0 (0.0-8.0)		4.0 (0.0-13.0)		77.0 (59.0-95.0)	
Cigarette use	Yes	3.0 (0.0-8.0)	0.078	5.0 (0.0-16.0)	**0.036**	66.0 (52.0-91.0)	**0.011**
	No	2.0 (0.0-7.0)		3.0 (0.0-12.0)		78.0 (64.0-96.0)	
Active psychiatric disorders	Yes	3.0 (0.0-8.0)	**<0.001**	4.0 (0.0-14.0)	**<0.001**	74.0 (58.0-94.0)	**0.015**
	No	0.0 (0.0-0.0)		0.0 (0.0-0.0)		84.0 (75.0-103.0)	
Status of psychiatric treatment	Yes	3.0 (0.0-8.0)	**<0.001**	5.0 (0.0-14.0)	**0.001**	72.0 (57.0-94.0)	**0.023**
	No	1.0 (0.0-6.0)		1.0 (0.0-10.5)		80.5 (65.0-97.0)	
Family history of psychiatric disorders	Yes	4.0 (0.0-9.0)	**0.006**	6.0 (1.0-17.0)	**<0.001**	66.0 (52.0-85.0)	**<0.001**
	No	2.0 (0.0-7.0)		2.0 (0.0-11.0)		80.0 (64.0-98.0)	
History of self-injurious	Yes	6.0 (2.0-9.0)	**0.008**	7.0 (0.0-17.0)	0.071	69.0 (59.0-82.0)	0.149
	No	2.5 (0.0-7.0)		3.0 (0.0-12.0)		77.0 (59.0-95.0)	
History of suicide attempts	Yes	5.0 (2.0-12.0)	**0.001**	5.0 (0.0-15.0)	0.175	66.0 (52.0-86.0)	**0.005**
	No	2.0 (0.0-7.0)		3.0 (0.0-13.0)		78.0 (60.0-96.0)	
History of organic disease	Yes	2.0 (0.0-7.0)	0.357	1.0 (0.0-11.0)	**0.036**	77.0 (57.0-96.0)	0.784
	No	3.0 (0.0-7.0)		4.0 (0.0-14.0)		75.0 (60.0-94.0)	
Skipping at least one meal per day	Yes	4.5 (0.0-9.0)	**<0.001**	6.0 (0.0-16.0)	**0.001**	75.5 (59.0-95.0)	0.627
	No	2.0 (0.0-6.0)		2.0 (0.0-11.0)		77.0 (58.0-95.0)	
Skipped meal	Morning	4.0 (0.0-9.0)	0.198	6.0 (0.0-14.0)	0.419	74.0 (61.0-95.0)	0.768
	Afternoon	6.0 (1.0-10.0)		9.5 (0.0-17.0)		76.0 (59.0-97.0)	
	Evening	3.0 (0.0-5.0)		4.0 (1.0-7.0)		77.0 (57.0-91.0)	
Consuming junk food between meals	Yes	6.0 (2.0-9.0)	**<0.001**	10.5 (2.0-18.0)	**<0.001**	70.0 (57.0-94.0)	**0.04**
	No	1.0 (0.0-6.0)		1.0 (0.0-9.0)		78.0 (62.0-96.0)	
Engaging in physical activity	Yes	2.5 (0.0-6.0)	**0.025**	3.0 (0.0-13.0)	0.314	80.0 (63.0-97.5)	**0.001**
	No	3.0 (0.0-8.0)		4.0 (0.0-14.0)		71.0 (56.0-89.0)	
Dieting effort at some point in their lives	Yes	3.0 (0.0-8.0)	0.162	4.0 (0.0-16.0)	0.084	71.0 (58.0-90.0)	0.052
	No	3.0 (0.0-6.0)		3.0 (0.0-12.0)		78.5 (59.0-98.0)	
Having a family member with obesity in their family history	Yes	3.0 (0.0-8.0)	0.809	4.0 (0.0-14.5)	0.905	68.0 (57.5-88.0)	**0.025**
	No	3.0 (0.0-7.0)		3.0 (0.0-13.0)		78.0 (61.0-97.0)	
Planning for bariatric surgery	Yes	6.0 (0.0-12.0)	0.062	7.0 (1.0-25.0)	0.064	59.5 (51.0-94.0)	0.191
	No	3.0 (0.0-7.0)		4.0 (0.0-13.0)		76.0 (59.0-95.0)	

The Mann-Whitney U test was performed in paired groups, and the Kruskal-Wallis test was performed in more than two groups. [a,b]The group from which the difference originates. NEQ: Night Eating Questionnaire, PSQI: Pittsburgh Sleep Quality Index, MEQ: Mindful Eating Questionnaire

Table 3. Scale scores according to the participants' primary psychiatric diagnoses

	PSQI	NEQ	MEQ total	n
	Median (IQR)	Median (IQR)	Median (IQR)	
Generalized anxiety disorder	5.0 (2.0-8.0)	8.0 (1.0-16.0)	77.0 (62.0-98.0)	71
Panic disorder	5.0 (1.0-8.0)	9.0 (0.0-24.0)	70.0 (63.0-79.0)	15
NOS-psychosis	7.5 (3.0-11.0)	9.5 (4.0-17.5)	57.0 (45.0-69.5)	16
Schizophrenia	8.0 (2.5-8.5)	3.5 (2.5-6.0)	47.5 (38.5-53.5)	12
Obsessive compulsive disorder	2.0 (0.0-7.0)	1.0 (0.0-14.0)	85.0 (65.0-98.0)	15
Conversion disorder	0.0 (0.0-6.0)	0.0 (0.0-13.0)	61.0 (53.0-98.0)	11
Somatic symptom disorder	1.0 (0.0-6.0)	0.0 (0.0-6.0)	85.0 (72.0-97.0)	15
Depressive disorder	5.5 (3.0-11.0)	7.5 (2.0-14.0)	73.5 (64.0-94.0)	50
NOS-anxiety disorder	2.0 (0.0-8.0)	3.0 (0.0-14.0)	86.0 (60.0-100.0)	55
Dysthymic disorder	0.0 (0.0-9.0)	0.0 (0.0-6.0)	65.0 (57.0-94.0)	11
Bipolar disorder	1.5 (0.0-5.5)	4.0 (0.5-19.0)	68.5 (59.5-87.5)	12
Alcohol and substance use disorders	9.0 (9.0-9.0)	11.0 (11.0-11.0)	71.0 (71.0-71.0)	1
Impulse control disorders	0.0 (0.0-1.0)	0.0 (0.0-0.0)	53.0 (46.0-66.0)	5
Social anxiety disorder	0.0 (0.0-10.0)	0.0 (0.0-14.0)	93.0 (70.0-112.0)	11
Hypochondriasis	1.0 (0.0-4.5)	0.0 (0.0-9.0)	92.0 (67.0-110.0)	8
NOS-mood disorder	5.0 (2.0-8.0)	11.5 (4.0-19.0)	58.0 (53.0-61.0)	10
Attention-deficit/hyperactivity disorder	0.0 (0.0-0.0)	0.0 (0.0-26.0)	55.0 (45.0-65.0)	9
Gender identity disorder	0.0 (0.0-0.0)	0.0 (0.0-0.0)	82.0 (82.0-82.0)	1
Adjustment disorder	1.0 (0.0-2.0)	1.0 (0.0-3.0)	78.0 (68.0-82.0)	11
Posttraumatic stress disorder	5.5 (4.0-10.0)	10.5 (2.0-18.0)	72.0 (37.0-80.0)	6
Agoraphobia	0.0 (0.0-0.0)	0.0 (0.0-0.0)	89.5 (81.0-97.0)	4
Acute stress disorder	3.0 (3.0-4.0)	8.0 (4.0-9.0)	69.0 (66.0-84.0)	5

NEQ: Night Eating Questionnaire, PSQI: Pittsburgh Sleep Quality Index, MEQ: Mindful Eating Questionnaire

with less impulsive eating, lower calorie consumption, and healthier food choices.

In addition to subgroups of diseases that were not separately examined in our study, ADHD patients might experience difficulties, particularly in the focus, eating control, and disinhibition subgroups of EM. Similarly, difficulties with disinhibition observed in schizophrenic patients might prevent them from being aware of the signals that initiate and terminate eating. Anhedonic states with disinhibition may reduce control over eating behavior and even lead individuals to choose palatable, high-carbohydrate foods. Although we are not certain, we believe that this finding is not solely due to the effects of psychotropic drugs on appetite and weight.

Those who skipped at least one meal per day and those who consumed junk food had poorer sleep quality and higher NES scores. In addition, those who consumed junk food had lower EM. Although studies have found low EM in individuals who skip meals (23), we did not find a significant association between these two factors. However, we found a significant difference between junk food consumption and EM. EM encompasses nutritious food choices, mindful awareness of the consequences of the foods consumed, and eating patterns that respond to hunger-satiety signals. Accordingly, the low EM observed in those who consumed extra junk food between meals was an expected outcome.

On the other hand, skipping breakfast in NES is expected. 18.6% of the participants skipping breakfast (42% skipped at least one meal). Sleep quality affects eating episodes. It was found that people with low sleep duration skipped breakfast more often than did normal people. It has been reported that people with low sleep duration skip meals, consume snacks in the form of junk food, and consume most of their food in the late evening or at night. The habit of eating junk food is associated with shorter sleep duration (24).

Individuals who reported engaging in regular physical activity had significantly better sleep quality and significantly higher EM than those who did not. Although participants' reports of physical activity ranged from "daily" to "1-2 times a month," physical activity level was not clearly measured in our study; however, it appears to influence both parameters. Physical activity regulates the stress response and helps control sleep quality and eating. It facilitates falling asleep and maintaining sleep, increases the depth of sleep, positively regulates the autonomic nervous system, and increases sleep quality through restful sleep (25). Physical activity has also been reported to influence eating behavior, eating timing, the amount of food consumed, and the selection of palatable and high-calorie foods, which is referred to as hedonic eating (26).

As the participants' BMI index increased, their sleep quality decreased, their night eating scores increased, and their EM decreased (they had less

disinhibition of eating, eating control, focus on eating, and emotional eating). This is, however, the result that we expected. A bidirectional interaction between weight gain and sleep. The timing and content of eating can influence our sleep duration and phases (27). Because the relationship between EM and BMI is well known, studies have also been conducted with EM training, and it was found that participants who received mindfulness training ate fewer calories and improved their control over their eating (28,29). Literature data consistent with our findings have shown us that there is a significant negative relationship between EM, its subdimension, and BMI (8,30). However, emotional eating is generally positively correlated with BMI, although it is usually not the only cause of being overweight. In the evaluation of the MEQ, "emotional eating," a subdimension of the scale, was one of the factors that caused uncontrolled weight gain. However, emotional eating was found to be less prevalent among the participants. This led us to believe that loss of control over eating and difficulty in focusing on eating might have a greater impact on BMI. At the same time, in this study, we can say that the subdimension of emotional eating was not severe enough to affect the MEQ total. It may be an alternative to evaluate the relationship between BMI and emotional eating using another scale that includes only emotional eating. EM is a skill training and behavior that can be acquired. It is known that EM is low in individuals with obesity,

Table 4. Correlation of age BMI and scale scores

		Age	BMI	PSQI	NEQ	MEQ total
BMI	r	**0.311**				
	p	**0.001**				
PSQI	r	-0.089	**0.170**			
	p	0.082	**0.001**			
NEQ	r	**-0.112**	**0.149**	**0.737**		
	p	**0.029**	0.003	0.001		
MEQ total	r	0.050	**-0.154**	**-0.213**	**-0.126**	
	p	0.329	**0.003**	**0.001**	**0.014**	
Disinhibition	r	0.036	**-0.132**	**-0.182**	**-0.124**	**0.733**
	p	0.489	**0.010**	**0.001**	**0.016**	**0.001**
Emotional eating	r	0.068	**-0.159**	**-0.205**	**-0.144**	**0.805**
	p	0.184	**0.002**	**0.001**	**0.005**	**0.001**
Eating control	r	**0.140**	**-0.111**	**-0.277**	**-0.229**	**0.734**
	p	**0.006**	**0.030**	**0.001**	**0.001**	**0.001**
Focus	r	0.010	**-0.109**	**-0.171**	**-0.111**	**0.734**
	p	0.845	**0.034**	**0.001**	**0.030**	**0.001**
Eating discipline	r	-0.020	-0.090	-0.095	-0.040	**0.663**
	p	0.696	0.079	0.063	0.435	**0.001**
Mindfulness	r	-0.030	-0.035	-0.045	0.029	**0.696**
	p	0.562	0.497	0.382	0.569	**0.001**
Interference	r	0.041	-0.093	**-0.162**	-0.094	**0.716**
	p	0.420	0.070	**0.002**	0.066	**0.001**

BMI: Body mass index, NEQ: Night Eating Questionnaire, PSQI: Pittsburgh Sleep Quality Index, MEQ: Mindful Eating Questionnaire

Table 5. Linear regression analysis of factors associated with NEQ

	β	SE	Standard β	t	p
NEQ (R^2=0.395; F=28.521; p<0.001)					
PSQI	1,169	0.082	0.595	14,278	**<0.001**
Disinhibition	-0.136	0.141	-0.073	-0.968	0.334
Emotional eating	-0.163	0.132	-0.092	-1,240	0.216
Eating control	-0.425	0.145	-0.214	-2,939	**0.003**
Focus	-0.210	0.141	-0.101	-1,489	0.137
Eating discipline	-0.211	0.163	-0.081	-1,298	0.195
Mindfulness	0.064	0.133	0.031	0.486	0.627
Interference	-0.002	0.236	-0.001	-0.010	0.992
MEQ total	0.157	0.088	0.375	1,774	0.077

NEQ: Night Eating Questionnaire, PSQI: Pittsburgh Sleep Quality Index, MEQ: Mindful Eating Questionnaire

and EM can also be observed in people who live with obese people. On the other hand, this study also found that EM was significantly lower in people who had a family member with obesity in their family history. To this end, programs that involve families try to develop EM skills in children to prevent childhood obesity (31).

As participants' night eating behaviors increased, their sleep quality decreased. To the extent that sleep quality decreased, EM (with the exception of eating discipline and mindfulness) also significantly decreased. In other words, as sleep quality decreased, participants' emotional eating decreased, they experienced difficulty restraining themselves from eating, and their control over their timing, speed, and amount of food intake decreased. It became more difficult for them to cope with the distractions of eating. It has been reported that shortening sleep duration can lead to excessive caloric intake by affecting both eating behavior and diet composition. These individuals have been shown to eat more, tend to consume junk food, and choose high-calorie foods. In addition, poor sleep quality disrupts the mechanisms that influence appetite control (32). Another important finding of our study is that sleep quality predicts attitude toward night eating. We know that NES is also related to sleep problems and sleep quality (7). In a 2017 study, individuals with NES symptoms experienced shorter sleep duration and poorer sleep quality than those without NES symptoms. Eating and sleeping rhythms, which are closely linked and synchronized, are disrupted in people diagnosed with NES (33).

While the participants' night eating behaviors increased, their EM decreased. This decrease included less disinhibition of eating, less emotional eating, loss of eating control, and increased preoccupation with thoughts other than eating. The overweight observed in NES was related to eating control (34). Mindfulness means paying attention and observing by focusing on the moment in a controlled manner. When a person with NES eats after waking up, it is not related to mindfulness, although it actually happens at the conscious level (13). Most eating disorder studies have shown that higher levels of mindfulness are associated with lower levels of eating disorder psychopathology (35,36). Another important finding of our study is that "eating control" in EM predicts participants' night eating attitudes. This indicates that individuals with NES generally prefer high-sugar and high-fat foods at night. These individuals lack cognitive and behavioral skills for self-control and exhibit an exaggerated reward response to eating based on the same neural pathways as those with obesity (37).

Study Limitations

The limitations of this study include its single-center nature and the presence of participants using psychotropic drugs, as well as the potential influence of additional organic diseases on eating and sleep.

Conclusion

Our findings indicate that NES is under the influence of biopsychological factors associated with psychopathology in psychiatric outpatient clinics. Similarly, NES, EM, and sleep quality were closely related. The fact that participants were overweight in terms of BMI underscores the importance of this relationship. NES predicts "eating control" and sleep quality in the EMQ. Structured and controlled eating patterns with high EM may improve BMI control and sleep quality. Sleep problems in patients with psychiatric disorders should also be investigated in terms of patients' eating attitudes. The eating habits of these patients and their eating attitudes should be carefully examined, and appropriate training should be provided.

Ethics Committee Approval: Ethical approval for the study was obtained from the Clinical Research Ethics Committee of University of Health Sciences Turkey, İstanbul Training and Research Hospital (approval number: 56, date: 11.02.2022).

Informed Consent: Written informed consent was obtained from all participants.

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