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Evaluation of the Effect of Hedonic Hunger on Nutrition Change Processes and Its Relationship with BMI: A Study on University Students

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ABSTRACT

Objective: The aim of this study is to evaluate the effect of hedonic hunger on nutritional change processes and its relationship with BMI in university students.

Methods: A questionnaire consisting of sociodemographic characteristics, questions about eating habits, Power of Food Scale (PFS) and Nutrition Change Processes Scale (NPCS) were applied to 1003 undergraduate students.

Results: Majority of the students were female and normal weight in terms of BMI. The median PFS and score of the obese students is higher than the normal ones. The median NPCS scores of obese students are higher than other BMI classifications ($p< .01$). The median scores of food available, food present and food taste sub-factors of PFS are statistically higher in obese students than in normal-weight students ($p< .01$). The sub-factors of NPCS that consciousness raising, dramatic relief, self-reevaluation, social liberation, contingency management, self-liberation, stimulus control median scores are statistically higher in obese students than in normal-weight students. As hedonic hunger increases, the nutritional change process increases by 13.7%. The increase in hedonic hunger affects the nutritional change processes positively by 46.1% ($p< .001$).

Conclusion: Hedonic hunger and nutrition change processes of obese students are higher than those of normal weight, and as hedonic hunger increases, the process of nutritional change increases, and the increase in hedonic hunger positively affects nutritional change processes.

Keywords: Hedonic hunger, nutrition assessment, body mass index, obesity

1. INTRODUCTION

Hunger is a biologically beneficial emotion, a metabolic impulse that reminds the individual of the need to seek and eat food. Considering the increasing prevalence of obesity in the world, it is seen that food consumption is based on pleasure as well as energy needs (1). This indicates two types of hunger, homeostatic and hedonic. Homeostatic hunger results from an energy deficit and develops independently of the flavor of the food and after at least 8 hours of nutrient deprivation. Hedonic hunger, on the other hand, is defined as an appetizing urge to consume delicious foods for pleasure, as opposed to physiological energy needs (2). In addition to individual differences such as age, gender, menstrual cycle, nutritional habits, and sensitivity to food cues, factors such as excessive food cravings, impulsivity, self-perception, and experiences affect hedonic hunger. The sensory properties of food, such as taste, color, aroma, texture, and even sound, and experience with these senses have a strong influence on the control of food intake. In addition, it can act as a tool to support excessive food consumption (3).

Frequent and excessive consumption of delicious foods such as fatty and sugary foods, as a result of hedonic hunger; causes an increase in the risk of many diseases such as eating disorders and obesity, hypertension, diabetes mellitus, cardiovascular diseases, non-alcoholic fatty liver disease, obstructive sleep apnea, and some types of cancer (4).

Hedonic hunger is difficult to distinguish from non-hedonic hunger and should be evaluated as soon as it occurs (usually within 2-3 hours of food intake). This time frame helps to understand hedonic hunger rather than homeostatic (2). In a study examining the relationship between hedonic hunger and eating attitude, it has been shown that a high-fat and sugary diet not only disrupts the homeostatic control of feeding behavior and body weight but also causes dysregulation of the brain hedonic system (5).

During the university years, the time spent away from home increases, different emotional states are triggered, and socio-economic conditions vary in which new eating behaviors are acquired that will also affect adulthood (6). Studies examining

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the nutritional attitudes of university students found that increased consumption of processed foods high in sugar, energy, and fat and a decrease in fruit-vegetable and whole-grain consumption in this population (7,8). This change in nutritional patterns may result in the triggering of hedonic appetite and hedonic hunger mechanisms. For this reason, it is necessary to acquire nutritional awareness and proper nutrition patterns for the protection and development of physiological and psychological health. In this context, it is important to examine the relationship between nutritional change processes and hedonic hunger among university students. This study aims to evaluate hedonic hunger in university students and to examine its effect on nutritional change processes.

2. METHODS

The population of this cross-sectional and descriptive study consists of 5064 undergraduate university students enrolled in Üsküdar University in the 2021-2022 academic year. The sample of the study was obtained by choosing a simple random sample. The sample size was calculated using the formula with a certain universe, and it was calculated that 400 university students would be sufficient for the sample size calculation made with a sampling error of 0.05 and a 95% confidence interval for the study to be carried out. The study started after the approval numbered 61351342/ January 2022-41 from the Non-Interventional Research Ethics Committee of Üsküdar University and was completed with 1003 students who participated voluntarily.

2.1. Body Mass Index

Body mass index (BMI) is frequently used in the evaluation of obesity in adults and obtained by dividing body weight (kg) by the square of height (m^2). According to the World Health Organization, a BMI value below 18.5 kg/m^2 is defined as underweight; being between 18.5-24.99 kg/m^2 is normal weight; between 25.0-29.9 kg/m^2 is defined as overweight and over 30 kg/m^2 as obesity (9).

2.2. The Power of Food Scale

The Power of Food Scale (PFS) is a scale that evaluates the psychological effects of living in an environment where delicious foods are abundant. It has been stated as an effective tool for measuring hedonic hunger (10). Ülker et al. have made the validity and reliability of the scale into Turkish in adults (11). It is a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) and has theree sub-factors (food available, food present, and food tasted) that measure responses to food proximity. Evaluation is made out of 5 points, and an average score of more than 2.5 indicates the presence of hedonic hunger and being affected by food (10).

2.3. Nutrition Processes of Change Scale

It has been developed by Prochaska et al. to determine how experiences affect people's eating habits. Validity and reliability studies in Turkish were conducted by Menekli and Fadıloğlu. The scale consists of 48 items and 12 sub-dimensions, and each item of the scale is evaluated with a grading score ranging from 1 (never) to 5 (very often). The subscales of this scale are consciousness raising, dramatic relief, environmental revaluation, self-reevaluation, social liberation, counterconditioning, helping relationships, contingency management, self-liberation, stimulus control, peer-to-peer system control, drug use. The highest score that can be obtained from the scale is 240, and the lowest score is 48 (12,13).

2.4. Statistical Analysis

Descriptive statistics for categorical variables are presented as frequency and percentage. The conformity of the numerical variables to the normal distribution was checked with the Shapiro-Wilk Test. The "Mann-Whitney U" Test was used for the comparison of two independent groups that did not have normal distribution, and the "Kruskal-Wallis H Test" was used for the comparison of more than two groups. Examining the relationships between the scales was determined by "Spearman's Rank Differences Correlation Coefficient". "Regression Analysis" was used to test the effect between variables. Regression analysis is the explanation of the relationship between two related variables, a dependent variable, and an independent variable, with mathematical equivalence (14). In all calculations and interpretations, the statistical significance level was considered as "$p< .05$" and hypotheses were established as bidirectional. Statistical analysis of the data was performed on the SPSS v26 (IBM Inc., Chicago, IL, USA) statistical package program.

3. RESULTS

Descriptive statistics of a total of 1003 university students participating in the study are presented in Table 1. Average age of students is 21.31±2.70 years. In terms of BMI classification, 75.5% of the students were normal weight, 19.1% were overweight and 5.4% were obese. 84.9% of female students and 53.5% of male students are of normal weight in terms of BMI. 67.5% of the students are studying in health related departments and 32.5% of them are studying in other fields. 35.4% of the students consume 1.5-≤2 L/d of water. 82.2% of the students skip meals and the most frequently skipped meal is lunch with 36.0%. 89.2% of the students do not use nutritional supplements.

Table 1. *Descriptive statistics of demographic and nutritional findings of university students*

	Female		Male		Total
Age	21.18±2.85		21.60±2.29		21.31±2.70
BMI	**n**	**%**	**n**	**%**	**n %**
Normal	596	84.9	161	53.5	757 75.5
Overweight	70	10.0	122	40.5	192 19.1
Obese	36	5,1	18	6.0	54 5.4
Department					
Health Science	474	67.5	82	27.2	556 55.4
Others	228	32.5	219	72.8	447 44.6
Daily Water Consumption (L/d)					
<1 L/d	121	17.2	11	3.7	132 13.2
1-≤1.5 L/d	198	28.2	54	17.9	252 25.1
1,5-≤2 L/d	230	32.8	125	41.5	355 35.4
2-≤2.5 L/d	103	14.7	70	23.3	173 17.2
2.5-≤3 L/d	50	7.2	41	13.6	80 8.0
>3 L/d	4	0.6	7	2.3	11 1.1
Skipping Meal					
Yes	587	83.6	237	78.7	824 82.2
No	115	16.4	64	21.3	179 17.8
Meal Skipped					
Breakfast	130	22.2	65	27.7	195 23.8
Lunch	241	41.2	54	23.0	295 36.0
Dinner	21	3.6	2	0.9	23 2.8
Mid-morning	138	23.6	95	40.4	233 28.4
Afternoon	39	6.7	16	6.8	55 6.7
Night	16	2.7	3	1.3	19 2.3

In PFS scores, the median score of female students [42 (15-75)] is higher than male students [38 (15-75)] (U=95276.5; p< .05), in terms of BMI classification, obese students (55[b] (20) – 75) mean score was higher than those with normal BMI classification (H=20.736; p< .001), the median higher than those who drank more than 3 L/day (46 (16-59) were 1.5-2 lt and 2.5-3 L and 2-2.5, respectively, It was found that the median score of the students who skip meals [42 (15-75)] is statistically higher than the students who do not skip meals [37 (15-75)] (U= 66362.5; p< .05), female students [91 (48-238)] mean score in NPCS scores is higher than male students [84 (48-225)] (U=90873; p< .001), BMI classification In terms of other BMI classification, the median score of obese students was 136.5[b] (63-204), higher (H=11.191; p< .01), the median score of those who drank more than 3lt./day (109 (52-138)) was higher than those who drank less water (H=31593; p< .001), the students who did not skip meals [98 (48 – 238)] score medians were higher (U=61031.5; p< .001) than students who did not skip meals [88 (48-225)], and the median score of those who skipped the night meal (101 (48-222) was statistically higher than those who skipped the morning meal was found to be high (H=25.273; p< .001) (Table 2).

In the comparison of PFS scores of university students according to their gender, the median score of female students [17 (6-30)] in the "Available Food" sub-factor score of the scale compared to male students [15 (6-30)] (U=92613.5; p< 0.01), the median score of female students [15 (5-25)] in the "Taste of Food" sub-factor score compared to male students [14 (5-25)] (U=97401.5; p< .05) and " The median score of female students [42 (15-75)] was found to be statistically higher than that of male students [38 (15-75)] in the "IDI Total" score (U=95276.5; p< .05). No significant difference was found in all other sub-factors (p> .05). Comparing the NPCS scores of university students by gender, the median score of female students [7.5 (4-20)] in the "Increase in Consciousness Level" sub-factor score of the scale compared to male students [6 (4-17)] (U=87235.5; p< .001), the median score of female students [9 (4-20)] in the "Dramatic Help Emotional Stimulation" sub-factor score compared to male students [8 (4-20)] (U=87345; p< .001), The median score of female students [8 (4-19)] in the sub-factor score of "Re-evaluation" compared to male students [7 (4-20)] (U=87723; p< .001), in the sub-factor score of "Self-Reassessment" the female students The median score of students [8 (4-20)] compared to male students [7 (4-20)] (U=96493.5; p< .05), "Contrasted Situation" sub-factor score of female students [8 (4-20)] mean score, compared to male students [7 (4-20)] (U=88688.5; p< .001), in the "Helpful Relationships" sub-factor score of female students [8 (4-20)] the median score compared to male students [7 (4-20)] (U=78138.5; p< .001), In the "Self-Liberation" sub-factor score, the median score of female students [8 (4-20)] compared to male students [7 (4-20)] (U=83403.5; The median score of female students [91 (48-238)] was found to be statistically higher than male students [84 (48-225)] in p< .001) and "NPCS Total" scores (U=90873; p< .001). No significant difference (p> .05) was found in all other sub-factors (Table 3).

In comparing PFS scores of university students according to BMI groups, the median score of obese students [22.5 (8-30)] in the "Available Food" sub-factor score of the scale, compared to normal weight students [16 (6-30)] (H=43.203; p< .001), and the "Food Present" sub-factor score of obese students [14 (5-20)] the median score of obese students [18 (7-25)] in the "Food Taste" sub-factor score (H=50<796; p< .001) and according to normal weight students [9 (4-20)], statistically higher than normal weight students [14 (5-25)] (H=47.530; p< .001).

In comparing NPCS scores by BMI groups of university students, the "increase in consciousness" sub-factor score of the scale compared to obese students [12.5 (4-19)] score median, normal weight students [7 (4-20)] and fat students [7 (4-19)] (H=52.603; p< .001), the median score of obese students in the "Dramatic Relief " sub-factor score [13 (4-18)] compared to normal weight students [8 (4-20)] (H=67.630; p< .001), The median score of obese students [11 (4-19)] in the "Environmental Reevaluation" sub-factor score, according to fat students [7 (4-20)] (H=32.785; p< .001), and the "Self – Reevaluation" sub-factor score of obese students [13 (7-20)] according to normal weight students [7 (4-20)] (H=121.782; p< .001), the median score of obese students [14.5 (4-20)] in the " Social Liberation " sub-factor score, according to normal weight students [10 (4-20)] (H=119.430; p< .001), " Counterconditioning " sub-factor score of obese students [11.5 (4-19)] according to the median score, normal weight

students [7 (4-20)] and fat students [7 (4-20)] (H=57.627; p< .001), the median score of obese students in the " Helping Relationships " sub-factor score [12 (4-20)] compared to normal weight students [8 (4-20)] and fat students [8 (4-20)] (H=45.904; p< .001), The median score of obese students in the " Contingency Management " sub-factor score [11 (4-19)] compared to normal weight students [5 (4-20)] (H=58.686; p< .001), and the "Self-Liberation" sub-factor score of obese students [13 (7-20)] according to normal weight students [7 (4-20)] (H=95.474; p< .001), "Stimulus Control" is the median score of obese students [10 (4-17)] in the sub-factor score, according to normal weight students [5 (4-20)] and fat students [5 (4-20)] (H=48.726; p< .001), the " Peer-to-Peer System Control " sub-factor score of obese students [10 (4-19)] score median, the median score of obese students [6 (4-20)] and fat students [6 (4-20)] (H=48.533; p< .001) and obese students [7.5 (4-19)] in the "Drug Use" sub-factor score, it was found to be statistically higher than normal weight students [4 (4-20)]. (H=39.925; p< .001) (Table 4).

It was found that there was a very weak correlation between the PFS scores of the students and the NPCS scores (p= .137; p< .001) that was statistically significantly positive, and that there was a 13.7% increase in NPCS scores as the PFS scores of the students increased (Table 5).

Table 2. *Comparison of demographic and nutritional findings of university students, Power of Food Scale and Nutrition Processes of Change Scale scores*

	Power of Food Scale (PFS)			Nutrition Processes of Change Scale (NPCS)		
Gender	**Median (min-max)**	**U – *H***	**p**	**Median (min-max)**	**U – *H***	**p**
Female	42 (15-75)	**95276.5**	**0.014***	91 (48-238)	**90873**	**<0.001***
Male	38 (15-75)			84 (48-225)		
BMI						
Normal	40[a] (15-75)	**20.736**	**< 0.001***	87[a] (48-238)	**11.191**	**0.001***
Overweight	47[ab] (15-75)			94[ab] (48-225)		
Obese	55[b] (20-75)			136,5[b] (63-204)		
Department						
Health Science	40 (15-75)	115561	0.056	89,5 (48-222)	124109	0.973
Others	43 (15-75)			89 (48-238)		
Daily Water Consumption (lt/d)						
<1 L/d	45[bc] (15-75)	**40.291**	**< 0.001***	94[b] (48-222)	**31.593**	**<0.001***
1-≤1.5 L/d	45[bc] (15-75)			80,5[a] (48-170)		
1.5-≤2 L/d	42[b] (15-75)			87[ab] (48-238)		
2-≤2.5 L/d	34[a] (15-75)			98[bc] (48-225)		
2,5-≤3 L/d	37[ab] (15-71)			98[bc] (48-202)		
>3 L/d	46[c] (16-59)			109[c] (52-138)		
Skipping Meal						
Yes	42 (15-75)	**66362.5**	**0.035***	88 (48-225)	**61031.5**	**<0.001***
No	37 (15-75)			98 (48-238)		
Meal Skipped						
Breakfast	42 (15-74)	10.812	0.055	89[ab] (50-207)	**25.273**	**<0.001***
Lunch	41 (15-72)			92[ab] (48-225)		
Dinner	41 (22-71)			96[ab] (58-202)		
Mid-morning	44 (15-75)			78[a] (48-191)		
Afternoon	36 (15-74)			92[ab] (50-191)		
Night	37 (15-72)			101[b] (48-222)		

*U: Mann-Whitney U Test; H: Kruskal-Wallis H Test *p< 0.05;*

**a<ab<b; The difference between medians that do not have a common letter is significant (p< 0.05)*

Table 3. *Comparison of Power of Food Scale and Nutrition Processes of Change Scale Sub-Factor Scores of University Students by Gender*

PFS	Gender	Median (min-max)	U	p
Food available	Female Male	17 (6-30) 15 (6-30)	**92613.5**	**0.002***
Food present	Female Male	10 (4-20) 9 (4-20)	101712.5	0.347
Food tasted	Female Male	15 (5-25) 14 (5-25)	**97401.5**	**0.049***
NPCS				
Consciousness Raising	Female Male	7,5 (4-20) 6 (4-17)	**87235.5**	**< 0.001***
Dramatic Relief	Female Male	9 (4-20) 8 (4-20)	**87345**	**< 0.001***
Environmental Reevaluation	Female Male	8 (4-19) 7 (4-20)	**87723**	**< 0.001***
Self-reevaluation	Female Male	8 (4-20) 7 (4-20)	**96493.5**	**0.028***
Social Liberation	Female Male	10 (4-20) 11 (4-20)	99538	0.145
Counterconditioning	Female Male	8 (4-20) 7 (4-20)	**88688.5**	**< 0.001***
Helping Relationships	Female Male	8 (4-20) 7 (4-20)	**78138.5**	**< 0.001***
Contingency Management	Female Male	6 (4-20) 6 (4-20)	100996	0.254
Self-liberation	Female Male	8 (4-20) 7 (4-20)	**83403.5**	**< 0.001***
Stimulus Control	Female Male	5 (4-20) 5 (4-20)	104123	0.705
Peer-to-Peer System Control	Female Male	6 (4-20) 6 (4-20)	98058	0.066
Drug Use	Female Male	4 (4-20) 4 (4-17)	99147	0.092

*U: Mann-Whitney U Test PFS: Power of Food Scale, NPCS: Nutrition Processes of Change Scale *p< 0.05*
**a<ab<b; The difference between medians that do not have a common letter is significant (p< 0.05)*

Table 4. *Comparison of Power of Food Scale and Nutrition Processes of Change Scale Sub-Factor Scores of University Students by BMI*

PFS	BMI	Median (min-max)	H	p
Food available	Normal	16[a] (6-30)	**43.203**	**< 0.001***
	Overweight	18[ab] (6-30)		
	Obese	22,5[b] (8-30)		
Food present	Normal	9[a] (4-20)	**50.796**	**< 0.001***
	Overweight	12[ab] (4-20)		
	Obese	14[b] (5-20)		
Food tasted	Normal	14[a] (5-25)	**47.530**	**< 0.001***
	Overweight	17[ab] (5-25)		
	Obese	18[b] (7-25)		
NPCS				
Consciousness Raising	Normal	7[a] (4-20)	**52.603**	**< 0.001***
	Overweight	7[a] (4-19)		
	Obese	12,5[b] (4-19)		
Dramatic Relief	Normal	8[a] (4-20)	**67.630**	**< 0.001***
	Overweight	9[ab] (4-20)		
	Obese	13[b] (4-18)		
Environmental Revaluation	Normal	8[ab] (4-19)	**32.785**	**< 0.001***
	Overweight	7[a] (4-20)		
	Obese	11[b] (4-19)		
Self-reevaluation	Normal	7[a] (4-20)	**121.782**	**< 0.001***
	Overweight	8[ab] (4-20)		
	Obese	13[b] (7-20)		
Social Liberation	Normal	10[a] (4-20)	**119.430**	**< 0.001***
	Overweight	12[ab] (4-20)		
	Obese	14,5[b] (4-20)		
Counterconditioning	Normal	7[a] (4-20)	**57.627**	**< 0.001***
	Overweight	7[a] (4-20)		
	Obese	11,5[b] (4-19)		
Helping Relationships	Normal	8[a] (4-20)	**45.904**	**< 0.001***
	Overweight	8[a] (4-20)		
	Obese	12[b] (4-20)		
Contingency Management	Normal	5[a] (4-20)	**58.686**	**< 0.001***
	Overweight	7[ab] (4-20)		
	Obese	11[b] (4-19)		
Self-liberation	Normal	7[a] (4-20)	**95.474**	**< 0.001***
	Overweight	9[ab] (4-20)		
	Obese	13[b] (7-20)		
Stimulus Control	Normal	5[a] (4-20)	**48.726**	**< 0.001***
	Overweight	5[a] (4-20)		
	Obese	10[b] (4-17)		
Peer-to-Peer System Control	Normal	6[a] (4-20)	**48.533**	**< 0.001***
	Overweight	6[a] (4-20)		
	Obese	10[b] (4-19)		
Drug Use	Normal	4[a] (4-20)	**39.925**	**< 0.001***
	Overweight	4,5[ab] (4-17)		
	Obese	7,5[b] (4-19)		

*PFS: Power of Food Scale, NPCS: Nutrition Processes of Change Scale H: Kruskal-Wallis H Test; *p< 0.05*

**a<ab<b; The difference between medians that do not have a common letter is significant (p< 0.05)*

Table 5. *Correlation coefficients between PFS and NPCS*

		Total PFS	Total NPCS
Total PFS	**s**	1.000	0.137
	p	.	<0.001*
Total NPCS	**s**	0.137	1.000
	p	< 0.001*	.

*PFS: Power of Food Scale, NPCS: Nutrition Processes of Change Scale s: Spearman's Rank Correlation *p< 0.05*

It was found that the PFS scores of the students had a significant effect on their NPCS scores. PFS scores (β=0.461; t=5.916; p< .001); It accounts for 3.4% of who's scores (R2=,3.4; F=35.002; p< .001) (Table 6).

Table 6. *The effect of PFS scores on NPCS scores*

	Model	β	Std. Error	t	p	F	p
NPCS	(Constant)	75.807	3.407	22.252	< 0.001*	**35.002**	**< 0.001***
	PFS	0.461	0.078	5.916	< 0.001*		
	R=0.184; R^2=%3.4; Corrected R^2=%3.4						

*PFS: Power of Food Scale, NPCS: Nutrition Processes of Change Scale, Std. Error: Standart Error, t: test statistic, F: test value *p<0.05*

4. DISCUSSION

University years are a critical life stage in which adult dietary habits are acquired and pave the way for the risk of non-communicable diseases (15). In this period, besides the physiological factors affecting food choices and nutritional habits, the evaluation of hedonic hunger has a significant impact on understanding the nutritional change processes (16).

With the NPCS sub-dimensions, individuals' seeking new information about nutrition and increasing awareness, activating feelings about unhealthy life results, and how they are affected by the social environment about these behaviors are measured. Our results was determined that the median NPCS scores of obese students were significantly higher than those of normal weight. There is no study in the literature examining the relationship between NPCS and BMI. In a cross-sectional study, it was determined that there is an inverse relationship between obesity and nutritional attitude and nutritional knowledge. In addition, individuals with poor self-regulation of eating were more likely to be obese (17). Laz et al. found that obese individuals are more likely to engage in nutritional knowledge and related healthy weight loss behavior (18). This situation can be explained by the fact that obese individuals have higher nutritional change processes in parallel with the wrong nutrition practices they apply in the processes of losing and gaining weight.

In this study, increase in consciousness level, self-reappraisal, and opposite-opposite state scores, which are among the sub-factors of NPCS, were found to be higher in obese patients. The higher NPCS sub-dimension scores in obese patients may be due to the increased search for new information about nutrition, re-evaluation of unhealthy eating behaviors and their desire to increase the tendency to healthy behaviors instead. The available data in the literature show that obese people are more exposed to environments that will create obesity risk factors compared to normal-weight individuals (19,20). Our results, which supports the literature, NPCS scores, which also measure the effect of the social environment on the nutritional behavior process, are higher in obese patients.

We found that although the majority of the students were of normal weight, the BMI values of male students were higher than females. In addition, the median PFS score of obese students was found to be significantly higher than those of normal weight. Similarly, in a cross-sectional study conducted in adults, a positive and significant correlation was found between BMI and PFS scores (21). In a recent study conducted in adults, a significant positive correlation was found between BMI and PFS total scores (22). In contrast to these, Burger et al. In the study, no relationship was found between BMI and PFS (23). We found that the medians of all sub-dimensions of PFS were significantly higher in obese individuals than in normal weights. In their study, Ribeiro et al. showed that each unit increase in PFS score doubles the probability of being obese. In addition, nutrient power scale total score and sub-factors of food availability and nutrient availability sub-factor scores were found to be higher in obese than in normal-weight individuals (24). Andreeva et al. Similar to our study, a significant relationship was found between BMI and all sub-dimension scores such as food availability, food availability and food taste, and it was observed that the scores were higher in obese patients (25). In a study conducted in adults, it was found that the food availability and food availability sub-factor scores were significantly higher in obese compared to normal-weight individuals, while there was no significant difference in food taste subscale scores (26). Although there are inconsistencies as a result of studies examining the relationship between PFS and BMI, PFS reflects cognitive preoccupation and motivation to consume delicious foods, namely hedonic hunger. In this context, the significant increase in BMI and PFS scores in this study can be explained by the fact that the consumption of these foods due to hedonic hunger is probably a part of the weight gain process.

The PFS total score, food availability and food taste subscale scores were found to be significantly higher in female students than in males. The other study have reported that women experience higher levels of hedonic hunger and reward eating than men. In the study of Aliasghari et al., hedonic hunger levels were higher in women even when BMI and physical activity factors were kept constant (21). In a systematic review, it was reported that women may be more reactive to visual food stimuli, especially when they are hungry (27). One study found that, compared with men, women showed significantly greater activation to high-calorie foods in cortical regions related to behavioral control and self-referential cognition (28). As a result, this shows that female students have higher levels of hedonic hunger and food exposure. The reason why hedonic hunger is higher in women can be explained by the neural activity response to food stimuli in areas related to brain reward.

In this study, it was found that women were more likely to seek new information about nutrition, to take action to change unhealthy habits, to learn healthy behavior, to believe in changing their habits, and to receive support. Worldwide, overweight and obesity are more common in women (9). This may result in women focusing more on thoughts about their bodies, their desire to learn about healthy nutrition, and their preference for diet practices (29). The increase in nutritional knowledge can promote healthy weight loss behaviors (18). The fact that women are more adaptable to nutritional change processes can be explained by the fact that they can facilitate weight control processes.

It was found that although most of the students skipped meals, they skipped lunch most frequently. Similarly, another study conducted with university students show that the most frequently skipped meal is lunch (30). On the contrary, in a recent study conducted with university students, it was observed that the breakfast meal was skipped most frequently and this was due to reasons such as not feeling hungry, stress, and not having time to eat (31).

According to this study, lunch, mid-morning and breakfast meals were found to be the most frequently skipped meals, respectively. However, when the PFS results are evaluated, it can be said that hedonic hunger indicators are more prominent among students who skip meals. In a recent study conducted by examining the data of the American National Health and Nutrition Evaluation Study, it was found that skipping meals led to more energy intake in the next meals; It has been stated that the quality of the food consumed will decrease and health may be adversely affected over time (32). In another study conducted with high school students in parallel, it was found that adolescents with a higher hedonic hunger index reported more unhealthy food and beverage intake during their 4 years in high school, and that as a result of hedonic hunger, the liking for unhealthy foods and beverages increased over time and it was possible to control the consumption of these foods. It has been stated that it may be possible to reduce the ability of the patient (33). According to this; as well as physiological hunger caused by skipping meals; Sensitization to sensory environmental stimuli such as appearance, taste, smell and sound may be associated with triggering hedonic hunger and may result in malnutrition behaviors.

In this study, while PFS scores were found to significantly affect NPCS scores; A one-unit increase in students' PFS scores was associated with a 13.7% increase in NPCS scores. The frequent preference of delicious foods due to hedonic hunger and the fact that these foods are usually high in energy, salty, sugary and fatty may cause the development or progression of diseases such as obesity, hypertension and diabetes (34). In a study, it was found that the number of weight loss diets is higher in individuals with hedonic hunger (35). In our study, although statistically weak correlation was observed, it was observed that as hedonic hunger levels increased, compliance in the food exchange process increased. In this context, it is a possible outcome that individuals who have increased anxiety about obesity-related complications after hedonic fasting take steps to develop healthy eating behaviors.

5. CONCLUSION

In addition to nutritious environments, hedonic hunger triggers (such as delicious foods, feelings and thoughts related to appetite) affect nutritional change processes, and in this way, it is important both for individual to cope with hedonic hunger and to improve social dietary patterns in determining where the nutritional change processes of individuals at high risk of non-communicable diseases, especially obesity, are located. In this context, extensive studies are needed targeting larger populations in different groups of society or involving individuals at risk of different non-communicable diseases.

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