RESEARCH ARTICLE

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Determining the relationship between physical activity and intuitive eating and mindful eating in university students

Fatma Mert BIBEROĞLU[1] • **Sanem GÜVEN**[1] • **Zeynep Güler YENIPINAR**[1]

[1] Department of Nutrition and Dietetics, Faculty of Health Sciences, İstanbul Rumeli University, İstanbul, Türkiye

Abstract

In this study, it was aimed to determine the relationship between physical activity and intuitive eating (IE) and mindful eating (ME) in university students. The "International Physical Activity Short Form", "Mindful Eating Test (MET)" and "Intuitive Eating Scale (IES)" were applied by questioning the demographic characteristics, anthropometric measurements, health information and nutritional habits of 255 university students studying in Health and Sports sciences. Among the students whose mean age is 20.34±2.06, 86.7% of the students who are in health science are female, and 67.7% of them, who are in sports sciences are male ($p<0.05$). Students (51.4%) with normal Body Mass Index (BMI) consume three main meals and go on a diet for aesthetic reasons. Eating discipline (ED), emotional eating (EE), and intuitive eating total (IET) scores are higher in females, while control of eating (EC) scores are higher in males ($p<0.05$). Intuitive eating total score, reliance on hunger and satiety cues (RHSC), unconditional permission to eat (UPE) and EC cores are positively related to BMI. Students who are physically inactive have higher IET score, RHSC, body-food choice congruence, focusing and ED, and those who do adequate physical activity have higher eating control scores ($p<0.05$). Mindful eating total score and sub-dimensions are positively correlated with the score of all sub-dimensions except UPE, which is one of the sub-dimensions of IE ($p<0.05$). In addition, as the UPE score increases, the total scores of disinhibitions, ED, focusing, interference, EE, and ME decrease ($p<0.05$). In conclusion, ME and IE are positively related to each other. It is understood that adequate and balanced nutrition along with being physically active at the same time is quite important for younger individuals to be healthier.

Keywords: Intuitive eating, Mindful eating, Physical activity

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Corresponding Author:
Fatma Mert-Biberoğlu
E-mail: fatmaemert@gmail.com

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INTRODUCTION

Eating behavior, which takes place in every period of life, continues by developing from infancy to school age (Canetti et al., 2002). Eating behavior is affected by many factors. These factors can be individual such as genes, hormones, mood and body image; it can also be environmental, such as experiences, cultural background, religious beliefs, media (Özkan & Bilici, 2021). The relationship between eating behavior and mood in these processes is one of the important areas of study (Özkan & Bilici, 2018). Combined treatment of physical activity and calorie restriction has been recommended for weight control for many years (Kayar & Utku, 2013). On the other hand, cognitive restriction of food intake can create negative effects on the eating behavior. Deficiencies in stress management and long-term dietary practices may cause malnutrition habits. For that reason, the concepts of intuitive nutrition and mindful eating (ME) have come to the fore in gaining healthy eating attitudes and behaviors (Özkan & Bilici, 2018).

Intuitive nutrition is a self-care eating framework, which integrates instinct, emotion, and rational thought and was created by two dietitians, Evelyn Tribole and Elyse Resch in 1995 (Tribole & Resch, 2003). Intuitive eating (IE) aims to break the cycle of constant dieting by reconnecting with the body's natural signals of hunger, satiety and satisfaction (Tribole & Resch, 2003; Tylka, 2006; Camilleri et al., 2015). Intuitive eating aims to establish a healthy relationship between food, mind, and body. In addition, it supports awareness of emotions and experiencing the pleasure of eating. In the IE approach, main is to allow the body to recognize the internal hunger – fullness signals and amount and type of food consumed to feel more satisfied with meal (Van Dyke & Drinkwater, 2014). The concept of IE is explained by four sub-dimensions:

1) Eating for physical rather than emotional reasons (FRE)

2) Unconditional permission to eat (UPE) (desired food consumption in accordance with physical hunger signals),

3) Reliance on hunger and satiety cues (RHSC) (determining when and how much to eat)

4) Body-food choice congruence (BFCC) (Özkan & Bilici, 2018; Tylka, 2006)

Mindful eating is defined as acting consciously in food selection, developing an mindfulness in evaluating physical and psychological hunger and satiety cues, and making healthy food choices in response to these cues (Miller et al., 2014; Dalen et al., 2010).

In mindful eating, it is aimed to develop an mindfulness without prejudice to the physical and emotional feelings of the individual about eating (Jordan et al., 2014). The individual is aware of the moment during the meal and pays attention to the effect of food on the senses and thus realizes the physical and emotional sensations that occur in response to eating (Warren et al., 2017). Mindful eating consists of 7 sub-dimensions: disinhibition, emotional eating (EE), control of eating (EC), focusing, eating discipline (ED), mindfulness, external cues (Özkan & Bilici, 2018). Studies have linked the ability to eat mindfulness to less impulsive eating behavior, thereby reducing energy consumption and healthier snack choices (Bor & Saka, 2021).

Physical activity is also one of the most important parameters of a healthy life. Studies report the positive effect of physical activity on health in case of chronic disease. Regular physical activity: it contributes to the reduction of many diseases, to increase the individual's work efficiency, to the regulation of cognitive functions and school success, and to psychological well-being (WHO, 2023).

The aim of the study; to examine the relationship between IE, ME and physical activity status in university students who are a sensitive population in terms of irregular diet and eating disorders.

MATERIALS AND METHODS

This descriptive and cross-sectional study was carried out between May 2022 and July 2022 at İstanbul Rumeli University via Google Survey. Permission for the study was obtained from the Ethics Committee of İstanbul Rumeli University with the desicion no 02 dated 20.05.2022. Participants were asked to read and approve the participation before the survey. The population of the research consists of 374 individuals from the Faculty of Health and Sports Sciences. The sample includes a total of 255 students, 128 from the Faculty of Health Sciences and 127 from the Faculty of Sport Sciences, who agreed to participate in the study. Questionnaires applied to the participants consists of 4 parts which are given below;

1. Demographic Information

2. Intuitive Eating Scale (IES)

3. Mindful Eating Test (MET)

4. Physical Activity Status

In the first part of the questionnaire, the demographic information of the participants (general information, anthropometric measurements, health information, eating habits) was questioned. The Intuitive Eating Scale was used to determine IE behaviors. The Turkish validity and reliability of the scale developed by Tylka et al. was performed by Baş et al (Bas et al., 2017; Tylka & Kroon Van Diest, 2013). The scale consists of the sub-headings of unconditional consent to eat, eating for physical reasons rather than emotional reasons, RHSC, and BFCC. The scale is scored on a five-point Likert type (1=Strongly Disagree, 2=Disagree, 3=Neither Agree Neither Disagree, 4=Agree, 5=Strongly Agree). A minimum of 21 points and a maximum of 105 points are obtained on the scale. The Mindful Eating Test was used to detect eating awareness. The scale, which was validated and reliable by Kose et al., consists of 30 questions (Kose et al., 2017). The scale includes sub-dimensions of mindless eating, EE, eating control, awareness, ED, conscious eating, and interference. The scale is scored on a five-point Likert type (1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=

Always). A minimum of 30 and a maximum of 150 points are obtained on the scale. The physical activity status of the participants was evaluated with the International Short Form of Physical Activity (Öztürk, 2005).

Statistical Evaluation

SPSS 26 (IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.) statistical package program was used to evaluate the data obtained from the study. Quantitative data are expressed as number (n), percantage (%), descriptive values as frequency, arithmetic mean (x), standard deviation (ss). The conformity of the variables to the normal distribution was examined by histogram, probability graphs and Shapiro-Wilk test. When using independent sample t-test to compare 2 groups with normal distribution; Mann-Whitney U test was used to compare the data that did not have normal distribution. When comparing 3 or more groups, normally distributed groups were evaluated with ANOVA, and non-normally distributed groups were evaluated with Kruskal Wallis tests. In evaluating the relationship between continuous variables, Pearson Correlation Analysis has been used for the data which has a normal distribution and Spearman Correlation Analysis has been used for the data which were not normally distributed. Statistically significance level was determined as $p<0.05$.

RESULTS AND DISCUSSION

Results

Demographic information of the participants is given in Table 1. While the avarege age of participants who are studying in Health Sciences is 20.65±2.20, it is 20.03±1.87 in Sports Sciences ($p<0.05$). Female participants mostly (86.7%) are studying Health Sciences, male participants (67.7%) are studying Sports Sciences. Cigarette and alcohol consumption were higher in Sport Sciences' participants ($p<0.05$, $p>0.05$ respectively). While 91% of the participants do not have a chronic disease, in others asthma, diabetes mellitus and allergies are most common. The mean Body Mass Index (BMI) of those studying in Health and Sports Sciences is 22.26±3.28 and there is no statistical difference between the groups. In addition, although the level of physical activity is not desired level in both groups, it is related to the department of education ($p<0.05$).

According to nutritional characteristics (Table 2), 51.4% of the participants consume 3 main meals, while 36.5% do not consume snacks. It was determined that especially the number of main meals consumed was related to the department ($p<0.05$). While skipping meals is seen in 62.4% of the participants, the most skipped meal is breakfast for students who were studying health sciences and lunch for students who were studying sport sciences. The main reason of this was determined that the lack of time in both groups. While 60.4% of the participants reported that they have never had diet before, it was determined that the others had dieted mostly due to aesthetic reasons for both groups. In addition, it has been shown that those who diet for health are more likely than those who study health sciences. Accordingly, it was found that the reasons for dieting were related to the department of education ($p<0.05$).

Table 3 shows the BMI classification according to gender, department of education and physical activity level 69.7% of women and 73.8% of men are in the normal range. Below 70% of those studying in both departments are in the normal BMI range. In the majority of participants in each BMI group, the level of physical activity was lower than expected.

Table 4 shows the relationship between ME and its sub-dimensions and gender, department of education, BMI classification and physical activity level. The mean of the total score of ME was calculated as 2.55. Students above this score (45.88%) were determined as "Those with more awareness of eating", and those below (54.12%) as "Those with less awareness of eating". According to this evaluation, there was no statistical difference in terms of gender, department of education, BMI and physical activity level ($p>0.05$). Eating discipline and EE scores were higher in females ($p<0.001$), while eating control was higher in males ($p<0.001$). On the other hand, according to the department of education, ED is higher in health sciences and eating control is higher in sports sciences ($p<0.05$). There was no difference between underweight, normal, overweight and obese individuals in the total score and subdimensions of mindful eating ($p>0.05$). Mindful eating total score, interference, EE and mindfulness scores ($p>0.05$) and ED score ($p<0.001$) were higher in inactive individuals, while focusing score was lower in those with low physical activity level ($p<0.05$). Eating control score is higher in those with sufficient physical activity level ($p<0.05$).

Table 5 shows the relationship between IE and its sub-dimensions and gender, department of education, BMI classification and physical activity level. The mean of IET score was determined as 2.52. Students above this score (45.49%) were determined as "Those with more IE behavior", and students below (54.51%) as "Those with less IE behavior". According to this evaluation, women eat more intuitively than men ($p<0.05$). In addition, individuals who eat intuitively are statistically higher in BMI. There was no statistically significant difference between the sub-dimensions of IE between men and women ($p>0.05$).

However, IET score was much higher in women ($p<0.05$). When evaluated according to the department of education,

the UPE score is higher in those studying in sports sciences (p<0.05). When IET score was evaluated, it was lowest in normal individuals and highest in overweight participants (p<0.05). Unconditional permission to eat score, which is one of the sub-dimensions of IE, was highest in obese subjects and lowest in normal individuals (p<0.05). In inactive individuals, IET score and BFCC score were higher than the others (p<0.05), while the eating score due to hunger and satiety cues was lower in those with low physical activity level (p<0.05).

The relationship between ME and IE is shown in Table 6. The total score and sub-dimensions of ME are positively related to the score of all dimensions except UPE, which is one of the sub-dimensions of IE. Mindful eating increases stastistically as the UPE score which covers when people are hungry and what food they desire, decreases (p<0.05). Although not statistically significant, a negative relationship was observed in the sub-dimensions of eating control and mindfullnes.

Table 1. Demographic Information of Participants

Demographic Informations	Total (n_T=255)	Department of education		*p*
		Health Sciences (n_T=128)	Sports Sciences (n_T=127)	
	n (%)	n (%)	n (%)	
Age (years) (minimum-maximum)	20.34±2.06 (18-36)	20.65±2.20 (18-34)	20.03±1.87 (18-36)	**0.010***
Sex				**<0.001****
Female	152 (59.6)	111 (86.7)	41 (32.3)	
Male	103 (40.4)	17 (13.3)	86 (67.7)	
Tobacco Use				**0.022****
Yes	57 (22.4)	21 (16.4)	36 (28.3)	
No	198 (77.6)	107 (83.6)	91 (71.7)	
Alcohol Use				0.416
Yes	51 (20.0)	23 (18.0)	28 (22.0)	
No	204 (80.0)	105 (82.0)	99 (78.0)	
Disease status				0.051
Yes	23 (9.0)	16 (12.5)	7 (5.5)	
No	232 (91.0)	112 (87.5)	120 94.5)	
Disease type	**(n=23)**	**(n=16)**	**(n=7)**	0.243
Asthma	4 (17.4)	2 (12.5)	2 (28.6)	
Diabetes mellitus	4 (17.4)	1 (6.3)	3 (42.9)	
Allergies	3 (13.0)	3 (18.8)	0 (0.0)	
Familial Mediterranean Fever	1 (4.4)	1 (6.3)	0 (0.0)	
Hernia	2 (8.7)	2 (12.5)	0 (0.0)	
Psoriasis	1 (4.4)	0 (0.0)	1 (14.3)	
Thyroid disease	1 (4.4)	1 (6.3)	0 (0.0)	
Iron deficiency	1 (4.4)	0 (0.0)	1 (14.3)	
Peptic ulcer	1 (4.4)	1 (6.3)	0 (0.0)	
Rheumatic diseases	1 (4.4)	1 (6.3)	0 (0.0)	
Familial Mediterranean Fever and Psoriasis	1 (4.4)	1 (6.3)	0 (0.0)	
Allergies and Asthma	1 (4.4)	1 (6.3)	0 (0.0)	
Diabetes mellitus and Asthma	2 (8.7)	2 (12.5)	2 (28.6)	
Medication use				0.099
Yes	19 (7.5)	13 (10.2)	6 (4.7)	
No	236 (92.5)	115 (89.8)	121 95.3)	
BMI (kg/m²)	22.26±3.28	21.87±3.40	22.66±3.13	0.056
BMI classification				0.612
<18,5 kg/m²	25 (9.8)	14 (10.9)	11 (8.7)	
18,5-24,9 kg/m²	182 (71.4)	93 (72.7)	89 (70.1)	
25-29,9 kg/m²	39 (15.3)	16 (12.5)	23 (18.1)	
>30 kg/m²	9 (3.5)	5 (3.9)	4 (3.1)	
Level of physical activity				**<0.001****
Inactive	46 (18.0)	30 (23.4)	16 (12.6)	
Low level of physical activity	129 (50.6)	72 (56.3)	57 (44.9)	
Adequate physical activity level	80 (31.4)	26 (20.3)	54 (42.5)	

*Mann-Whitney U Test **Chi-square Test BMI: Body Mass Index n: number of participants nT: total number of participants

Table 2. Nutritional characteristics of the participants

Nutrition Status	Total (n_T=255)	Department of education		p
		Health Sciences (n_T=128)	Sports Sciences (n_T=127)	
	n (%)	n (%)	n (%)	
Main Meals				**0.008***
1	4 (1.6)	4 (3.1)	0 (0.0)	
2	103 (40.4)	62 (48.4)	41 (32.3)	
3	131 (51.4)	54 (42.2)	77 (60.6)	
4 and more	17 (6.7)	8 (6.3)	9 (7.1)	
Snacks				0.245
None	93 (36.5)	40 (31.3)	53 (41.7)	
1	65 (25.5)	32 (25.0)	33 (26.0)	
2	71 (27.8)	44 (34.4)	27 (21.3)	
3	19 (7.5)	8 (6.3)	11 (8.7)	
4 and more	7 (2.8)	4 (3.1)	3 (2.4)	
Meal skipping status				0.279
Yes	159 (62.4)	84 (65.6)	75 (59.1)	
No	96 (37.6)	44 (34.4)	52 (40.9)	
Skipped meals	**(n=159)**	**(n=84)**	**(n=75)**	0.279
Breakfast	63 (39.9)	35 (41.7)	28 (37.3)	
Lunch	69 (43.7)	34 (40.5)	35 (46.7)	
Dinner	10 (6.3)	6 (7.1)	4 (5.3)	
Snack	11 (6.9)	4 (4.8)	7 (9.3)	
Breakfast and lunch	2 (1.3)	1 (1.2)	1 (1.3)	
Breakfast and dinner	2 (1.3)	2 (2.4)	0 (0.0)	
Lunch and snack	2 (1.3)	2 (2.4)	0 (0.0)	
Reasons for skipping meals	**(n=141)**	**(n=70)**	**(n=71)**	0.273
Lack of hunger/loss of appetite	24 (9.4)	8 (11.4)	16 (22.5)	
Late awakening/sleep patterns	18 (7.1)	6 (8.6)	12 (16.9)	
Lack of time	59 (23.1)	31 (44.3)	28 (39.4)	
Lack of appetite for snack foods	4 (1.6)	3 (4.3)	1 (1.4)	
Bother to eat	8 (3.1)	4 (5.7)	4 (5.6)	
Habit	2 (0.8)	2 (2.9)	0 (0.0)	
Diet-dependent	1 (0.4)	0 (0.0)	1 (1.4)	
Lack of opportunity	6 (2.4)	5 (7.1)	1 (1.4)	
Forgetting to eat	4 (1.6)	2 (2.9)	2 (2.8)	
Overeating at the previous meal/late	10 (3.9)	6 (8.6)	4 (5.6)	
hour	5 (2.0)	3 (4.3)	2 (2.8)	
Other				
Diet following status				0.107
Yes	101 (39.6)	57 (44.5)	44 (34.6)	
No	154 (60.4)	71 (55.5)	83 (65.4)	
Reason for following a diet	**(n=176)**	**(n=89)**	**(n=87)**	**0.002***
Health	24 (9.4)	18 (20.2)	6 (6.9)	
Aesthetics	105 (41.2)	56 (62.9)	49 (56.3)	
Other	47 (18.4)	15 (16.9)	32 (36.8)	
Duration of maintenance of weight loss	**(n=90)**	**(n=48)**	**(n=42)**	0.289
None				
0-6 m	4 (1.6)	3 (6.3)	1 (2.4)	
6-12 m	47 (18.4)	22 (45.8)	25 (59.5)	
12-18 m	19 (7.5)	14 (29.2)	5 (11.9)	
18-24 m	1 (0.4)	0 (0.0)	1 (2.4)	
>24 m	8 (3.1)	4 (8.3)	4 (9.5)	
	11 (4.3)	5 (10.4)	6 (14.3)	

*Chi-square Test n: number of participants nT: total number of participants

Table 3. Classification of BMI according to gender, department of education and physical activity

	Underweight (<18.5 kg/m²) n (%)	Normal weight (18.5-24.9 kg/m²) n (%)	Overweight (25.0-29.9 kg/m²) n (%)	Obese (>30.0 kg/m²) n (%)	Total n (%)
Sex					
-Female	23 (15.1)	106 (69.7)	17 (11.2)	6 (4.0)	152 (59.6)
-Male	2 (1.9)	76 (73.8)	22 (21.4)	3 (2.9)	103 (40.4)
Department of education					
-Health Sciences	14 (10.9)	93 (72.7)	16 (12.5)	5 (3.9)	128 (50.2)
-Sport Sciences	11 (8.7)	89 (70.1)	23 (18.1)	4 (3.2)	127 (49.8)
Level of physical activity					46 (18.0)
					129 (50.6)
-Inactive	4 (16.0)	31 (17.0)	9 (23.1)	2 (22.2)	
- Low level of physical activity	16 (64.0)	91 (50.0)	18 (46.2)	4 (44.4)	80 (31.4)
- Adequate physical activity level	5 (20.0)	60 (33.0)	12 (30.8)	3 (33.3)	
Total	25 (9.8)	182 (71.4)	39 (15.3)	9 (3.5)	***255***

n: number of participants *Chi-square Test

Table 4. The relationship between eating awareness and its sub-dimensions and gender, department of education, BMI classification and physical activity level

Mindful Eating Score		Sex		Department of education		Level of physical activity		
		Female	Male	Health Sciences	Sport Sciences	Inactive	Low level of physical activity	Adequate physical activity level
Mindful Eating total		2.55±0.49	2.55±0.53	2.55±0.51	2.55±0.50	2.66±0.44	2.49±.49	2.59±.55
p		0.946		0.943			0.086	
Disinhibition		2.41±0.85	2.54±1.04	2.43±0.88	2.50±0.99	2.41±.87	2.37±.84	2.65±1.09
p		0.282		0.563			0.184	
Eating discipline		3.07±0.74	2.60±0.98	3.02±0.82	2.74±0.90	3.26±.80[ab]	2.90±.80[a]	2.63±.93[b]
p		**<0.001***		**0.011***			**<0.001*****	
Focusing		2.63±0.51	2.74±0.51	2.61±0.50	2.74±0.52	2.85±.42[c]	2.60±.51[c]	2.69±.54
p		0.080		0.055			**0.006********	
Interference		2.29±0.86	2.38±1.04	2.25±0.92	2.41±0.95	2.51±.93	2.26±.82	2.33±1.10
p		0.417		0.175			0.278	
Emotional eating		2.52±1.00	2.13±1.11	2.47±1.03	2.26±1.09	2.46±1.03	2.29±.96	2.44±1.22
p		**<0.001****		0.114			0.592	
Control of eating		1.98±0.84	2.50±0.95	2.02±0.88	2.36±0.94	2.11±.78	2.07±.90[d]	2.43±1.00[d]
p		**<0.001****		**0.001****			**0.027********	
Mindfulness		2.81±0.40	2.84±0.43	2.86±0.36	2.79±0.45	2.94±.32	2.81±.40	2.78±.46
p		0.607		0.336			0.096	
ME Status (ME score)	**Higher** n (%)	68 (58.1)	49 (41.9)	55 (47.0)	62 (53.0)	22 (18.8)	53 (45.3)	42 (35.9)
	Lower n (%)	84 (60.9)	54 (39.1)	73 (52.9)	65 (47.1)	24 (17.4)	76 (55.1)	38 (27.5)
	p	0.656		0.349			0.262	

Table 4. The relationship between eating awareness and its sub-dimensions and gender, department of education, BMI classification and physical activity level (continue)

Mindful Eating Score		BMI classification				BMI (kg/m²)
		Underweight (<18.5 kg/m²)	Normal (18.5-24.9 kg/m²)	Overweight (25.0-29.9 kg/m²)	Obese (>30.0 kg/m²)	r p
Mindful Eating total		2.68±0.52	2.54±0.51	2.59±0.48	2.38±0.33	0.040
p			0.358			0.520
Disinhibition		2.42±0.98	2.50±0.92	2.41±1.05	2.00±0.48	-0.010
p			0.370			0.869
Eating discipline		3.31±0.56	2.84±0.85	2.83±1.07	2.81±0.86	-0.108
p			0.082			0.086
Focusing		2.86±0.52	2.64±0.52	2.71±0.46	2.64±0.33	0.003
p			0.310			0.967
Interference		2.48±0.70	2.35±0.96	2.23±1.01	1.83±0.56	-0.126
p			0.165			**0.044**[£]
Emotional eating		2.55±1.07	2.33±1.06	2.51±1.18	1.98±0.48	-0.048
p			0.523			0.447
Control of eating		2.23±0.96	2.13±0.92	2.41±0.92	2.28±0.72	0.221
p			0.283			**<0.001**[£]
Mindfulness		2.85±0.35	2.82±0.41	2.80±0.47	2.87±0.33	0.027
p			0.995			0.663
ME Status (ME score)	**Higher** n (%)	15 (12.8)	79 (67.5)	20 (17.1)	3 (2.6)	22.41±3.29
	Lower n (%)	10 (7.2)	103 (74.6)	19 (13.8)	6 (4.3)	22.14±3.29
	p		0.323			0.393

*Independent Samples t Test **Mann-Whitney U Test ***One-way ANOVA ****Kruskal Wallis Test [£]Spearman Test ME: Mindful Eating BMI: Body Mass Index n: number of participants

[a-d] In the same column, there is a statistically significant difference between those with the same exponential letter.

Table 5. The relationship between IE and its sub-dimensions and gender, major, BMI classification and physical activity level

Intuitive Eating Scale		Sex		Department of education		Level of physical activity		
		Female	Male	Health Sciences	Sport Sciences	Inactive	Low level of physical activity	Adequate physical activity level
Intuitive Eating total score		2.58±0.58	2.44±0.63	2.58±0.62	2.46±0.59	2.72±0.62[ab]	2.51±0.60[b]	2.43±0.59[a]
p		**0.038****		0.113		**0.036*****		
Unconditional Permission to Eat		2.96±0.59	2.93±0.76	2.87±0.64	3.03±0.68	2.86±0.58	2.96±0.65	2.98±0.72
p		0.791		**0.044***		0.197		
Eating for Physical Rather than Emotional Reasons		2.50±0.87	2.31±0.87	2.52±0.88	2.33±0.86	2.59±0.77	2.40±0.89	2.37±0.89
p		0.090		0.076		0.325		
Reliance on Hunger and Satiety Cues		2.40±1.00	2.25±1.26	2.47±1.07	2.22±1.15	2.71±1.21[c]	2.30±1.00	2.19±1.19[c]
p		0.311		0.073		**0.027*****		
Body-food choice congruence		2.37±1.02	2.20±1.24	2.42±1.05	2.18±1.17	2.81±1.16[df]	2.30±1.05[ef]	2.00±1.11[de]
p		0.240		0.088		**<0.001*****		
IES Status (ME score)	**Higher** n (%)	79 (68.1)	37 (31.9)	66 (56.9)	50 (43.1)	27 (23.3)	57 (49.1)	72 (51.8)
	Lower n (%)	73 (52.5)	66 (47.5)	62 (44.6)	77 (55.4)	19 (13.7)	32 (27.6)	48 (34.5)
	p	**0.012¥**		0.051		0.117		

Table 5. The relationship between IE and its sub-dimensions and gender, major, BMI classification and physical activity level (continue)

Intuitive Eating Scale		BMI classification				BMI (kg/m²)
		Underweight (<18.5 kg/m²)	Normal (18.5-24.9 kg/m²)	Overweight (25.0-29.9 kg/m²)	Obese (>30.0 kg/m²)	r p
Intuitive Eating total score		2.51±0.57	2.47±0.62[a]	2.78±0.55[a]	2.55±0.20	0.172 **0.006**[£]
p			**0.034*** **			
Unconditional Permission to Eat		2.89±0.71	2.89±0.69[bc]	3.14±0.43[c]	3.37±0.59[b]	0.139 **0.027**[£]
p			**0.040*** **			
Eating for Physical Rather than Emotional Reasons		2.54±0.92	2.37±0.90	2.61±0.72	2.28±0.68	0.034 0.584
p			0.344			
Reliance on Hunger and Satiety Cues		2.17±1.03	2.28±1.11	2.75±1.18	2.31±0.77	0.144 **0.022**[£]
p			0.062			
Body-food choice congruence		2.39±1.11	2.24±1.12	2.56±1.16	2.07±0.66	0.064 0.310
p			0.257			
IES Status (ME score)	**Higher** n (%)	12 (10.3)	71 (61.2)	28 (24.1)	5 (4.3)	22.85±3.51
	Lower n (%)	13 (9.4)	111 (79.9)	11 (7.9)	4 (2.9)	21.77±3.01
	p		**0.002**[¥]			**0.011****

*Independent Samples t Test **Mann-Whitney U Test ***One-way ANOVA ****Kruskal Wallis Test [£]Spearman Test [¥]Chi-square Test

IES: Intuitive Sating Scale BMI: Body Mass Index n: number of participants

[a-f]In the same column, there is a statistically significant difference between those with the same exponential letter.

Table 6. Correlation of Eating Awareness Scale and its Subscales and IES and its Subscales

	Intuitive Eating Total score	Unconditional Permission to Eat	Eating for Physical Rather than Emotional Reasons	Reliance on Hunger and Satiety Cues	Body-food choice congruence
Disinhibition	**r: 0.143 p=0.022**	**r: -0.268 p <0.001**	**r: 0.372 p <0.001**	**r: 0.012 p <0.001**	**r: 0.006 p <0.001**
Eating discipline	**r: 0.364 p <0.001**	**r: -0.334 p <0.001**	**r: 0.316 p <0.001**	**r: 0.392 p <0.001**	**r: 0.531 p <0.001**
Focusing	**r: 0.131 p=0.037**	**r: -0.239 p <0.001**	**r: 0.199 p=0.001**	r: 0.091 p=0.149	**r: 0.175 p=0.005**
Interference	r: 0.105 p=0.095	**r: -0.343 p <0.001**	**r: 0.310 p <0.001**	r: 0.030 p=0.633	r: 0.094 p=0.136
Emotional eating	**r: 0.331 p <0.001**	**r: -0.332 p <0.001**	**r: 0.565 p <0.001**	**r: 0.178 p=0.004**	**r: 0.155 p=0.013**
Control of eating	**r: 0.272 p <0.001**	r: -0.024 p=0.700	**r: 0.321 p <0.001**	r: 0.109 p=0.082	r: 0.095 p=0.131
Mindfulness	**r: 0.267 p <0.001**	r: -0.091 p=0.149	**r: 0.211 p=0.001**	**r: 0.244 p <0.001**	r: 0.122 p=0.051
MET score	**r: 0.382 p <0.001**	**r: -0.364 p <0.001**	**r: 0.579 p <0.001**	**r: 0.208 p=0.001**	**r: 0.230 p <0.001**

p: Spearman Test MET: Mindful Eating Total

DISCUSSION

In this study, it was aimed to determine the relationship between physical activity and IE and ME in university students studying in health and sports sciences. A statistically significant difference was found between the students studying in both departments in terms of age, gender, smoking consumption and physical activity level. The fact that 67.7% of the students studying in sports sciences are male and accordingly more cigarette consumption is appropriate for the literature (Çakaroğlu et al., 2020; Kuseyri, 2020; Özkan, 2018). Yılmaz et al. they showed that male students studying in sports sciences were more likely to consume cigarettes and alcohol, but there was no statistical difference (Yılmaz et al., 2007). In another study conducted with university students, it was determined that male students consumed more cigarettes ($p<0.05$) due to a greater sense of freedom and less family pressure (Kılıç et al., 2018). When the physical activity levels were examined in our study, it was observed that the students who were inactive or did insufficient physical activity were more in health sciences, those who had sufficient level in sports sciences ($p<0.05$). Similarly, studies indicating that sport sciences students have higher physical activity levels support our results (Çakaroğlu et al., 2020; Şahin et al., 2017).

When the main meal consumption was evaluated, 48.4% of the students in health sciences reported that they consumed two meals, and 60.6% of those in sports sciences consumed three meals. Although there is no statistically significant difference, the fact that breakfast and lunch are skipped more frequently in both departments shows that university students can skip these meals due to reasons such as being away from their families, being late for classes, economic reasons and spending more time outside. When the reasons for dieting of the students in both departments were questioned, it was determined that they dieted more for aesthetic appearance rather than being healthy ($p<0.05$). It is known that women experience more aesthetic anxiety than men and therefore they diet (Özkan, 2018). It is thought that this situation will put more pressure on women day by day, especially with the effect of social media.

It is possible to choose healthier foods depending on the increased sensitivity to the foods consumed because of the ME behavior. Thus, it is known that ME has an effective role in providing weight control (Kose et al., 2017; Özkan, 2018). When the participants' ME scores were evaluated according to gender, it was determined that there was no difference in the MET score, and the studies carried out support our results (Karataş & Müftüoğlu, 2021; Köse, 2017; Kuseyri, 2020; Özkan & Bilici, 2021; Serban et al., 2022). In addition, ED and EE scores were found to be significantly higher in women, and EC scores were significantly higher in men (Table 4). In a study conducted in Romania, it was determined that the EE score was significantly higher in women which is supporting our results. However, since the sub-dimensions of ME were different in the Romanian version of the ME scale, all of our sub-dimensions could not be compared (Serban et al., 2022). Since each society has different characteristics, different sub-dimensions and accordingly different results

may emerge as a result of the validity and reliability studies of the scales. Similar to our study, in a study conducted with university students, which showed that EE score was significantly higher in women, unlike us, the disinhibition score was higher in women and the focusing score was higher in men ($p<0.05$) (Çakaroğlu et al., 2020). However, in another study conducted in adults (19-45 years old) in Turkey, the ED score was higher in women and the EE score was higher in men, which is different from the results of our study (Özkan & Bilici, 2021). Since the age range in this study is different from ours, different results are expected. Therefore, in order to better observe these differences, cross-sectional or intervention studies should be conducted in different populations.

It was determined that the ED score in health science students and the EC score in sports science students were significantly higher. In a study involving a population similar to our study, EE and interference scores were higher in health science students, and mindfullness, ED and focusing scores were higher in sports science students ($p<0.05$) (Çakaroğlu et al., 2020).

Although there was no significant difference between MET and sub-dimension scores according to BMI classification in our study, it was observed that MET, disinhibition, ED, focusing, interference, and EE scores were lowest in obese individuals and highest in those with a underweight or normal BMI. In a study conducted with university students, it was determined that MET, disinhibition, and EC scores were highest in thin individuals and lowest in obese individuals ($p<0.05$), that all are supporting our results (Kuseyri, 2020). In addition, it was determined that BMI and interference score were negatively correlated, while EC score was positively correlated. However, it was shown in a study (Özkan & Bilici, 2021) that MET, disinhibition, EE and EC scores in women and EC scores in men were negatively correlated with BMI ($p<0.05$). In studies conducted with university students, it was determined that BMI decreased as EC and MET scores increased ($p<0.05$, $p>0.05$, respectively) (Karataş & Müftüoğlu, 2021; Köse, 2017; Kuseyri, 2020). Thus, depending on the increase in mindful eating, it is expected that BMI will decrease as a result of preferring to eat healthier foods more accurately.

When the relationship between physical activity levels and ME was examined in our study, it was determined that MET score ($p>0.05$) and ED and focusing scores ($p<0.05$) were highest in inactive individuals, and EC score was at the highest level in those with sufficient physical activity level. In Özmumcu's (2019) study with university staff, it was shown that as the MET score increases, the level of physical activity also increases (Özmumcu, 2019). Although this result that we obtained in university students does not comply with the literature, it is in question that it can not be adapted to the society in general, since the majority of those who do enough physical activity are educated in sports sciences.

Intuitive eating, which includes consuming food according to the internal stimuli of hunger and satiety, focuses on the physical hunger of the body in general, and overeating due to emotional reasons is prevented. It is negatively associated with BMI, especially in early adolescents, young adults, and college students (Ruzanska & Warschburger, 2019). Accordingly, as the IE tendency increases, it is seen that BMI decreases due to decreasing obsessive thoughts and social physical anxiety (Akırmak et al., 2021; Altay et al., 2022; Atalay, 2017; Ateş, 2021; Braun et al., 2022; Horwath et al., 2019; Kuseyri, 2020; Özkan, 2018; Özkan & Bilici, 2018, 2021; Ruzanska & Warschburger, 2019). However, in our study, IET, UPE, and RHSC scores showed a statistically significant positive correlation, although weakly, with BMI (Table 5). It was determined that the lowest IET score was in the normal BMI range, and the highest UPE score was in the obese individuals ($p<0.05$). In addition, it was observed that BMI was statistically higher in those who showed IE behavior. Studies have shown that there is a significant positive relationship (Özkan, 2018) between UPE score and BMI, and a negative relationship between UPE and diet quality (Horwath et al., 2019). However, what is observed in the literature contradicts the behavior of avoiding overeating, depending on the idea that the person can eat the food they want as soon as they feel physical hunger (Ateş, 2021). This situation shows that university students can not distinguish physical hunger from emotional hunger, or they prefer high energy foods more. In addition, since our study was limited to university students with a mean age of 20.34±2.06 years, significant results were revealed for this population. Only the UPE score was significantly higher for students studying sports sciences. However, although IET, FRE rather than emotional reasons, RHSC and BFCC scores were higher in health sciences students, no difference was found between departments. Sports science students are expected to be more physically active and accordingly to pay more attention to their appearance. For this, it is seen that overeating is avoided and can better focus on hunger signals.

In our study, the scores of the IET and its sub-dimensions were higher in women than in men ($p<0.05$ and $p>0.05$, respectively). This result shows that women have more IE behavior. However, it was determined that the scores of men were higher in studies (Horwath et al., 2019; Özkan, 2018; Özkan & Bilici, 2021; Ruzanska & Warschburger, 2017). Further studies with equal gender distribution need to be planned to clarify whether this differential result represents true gender differences.

People who can not accurately assess their hunger and satiety signals have difficulty in limiting their food consumption.

Therefore, EE behavior is seen in these people with more weight gain and accordingly the desire to diet (Atalay, 2017). In addition, it has been shown that people with a high BFCC score, which is associated with consuming delicious and healthy foods, have an increased level of physical activity and are healthier (Horwath et al., 2019; Ruzanska & Warschburger, 2019). However, when the physical activity levels of the participants were examined, it was determined that the IET, RHSC and BFCC scores of those who reported being inactive were significantly higher. This result contradicts the knowledge that people with IE tendencies increase their physical activity levels due to their desire to be healthier (Ateş, 2021). Therefore, these results should be re-evaluated by planning new studies with a wider age range and suitable for the general population.

In our study, it was shown that there is a significant positive relationship between mindful eating and IET scores, and other studies support this result (Kuseyri, 2020; Özkan & Bilici, 2021). When the relationship between the scores of the sub-dimensions of both scales was examined, a significant negative relationship (except for the EC and mindfulness scores; $p>0.05$) was observed only between the scores of the UPE score of ME and the sub-dimensions. In the study conducted by Kuseyri (2020), it was found that there was a negative correlation between UPE and all scores of mindful eating, which was in line with our results (Kuseyri, 2020).

Our study has some limitations. Since there is a difference between the numbers of female and male participants, this situation complicates the evaluations between both genders. Also, since only university students participated in the study, it is difficult to apply our results to the general population.

While there are studies in the literature showing the relationship between ME and IET scores, there are not many studies showing the relationship between all sub-dimensions of both scales. This is the strongest part of our study.

CONCLUSION

In conclusion, ME and IE appear to be positively related to each other. For young individuals to be healthier, the importance of adequate and balanced nutrition and being physically active is understood. However, there are inconsistencies in some results since the study was conducted with a limited group. Therefore, it is necessary to carry out more comprehensive studies that can reflect the general population.

Compliance with Ethical Standards

Peer-review

Externally peer-reviewed.

Conflict of interest

The authors declare that they have no competing, actual, potential or perceived conflict of interest.

Author contribution

Conceptualization, ZGY, FMB and SG; methodology, ZGY and SG; data collection and analysis, FMB and SG; writing-original draft preparation, FMB and SG; writing-review and editing, ZGY, FMB and SG. All the authors read and approved the final manuscript. All the authors verify that the text, figures, and tables are original and that they have not been published before.

Ethics committee approval

Ethics committee approval was obtained from the Ethics Committee of İstanbul Rumeli University with the desicion no 02 dated 20.05.2022.

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Data availability

Not applicable.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

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