

# Evaluation of Mindful Eating, Body Image and Anthropometric Measurements of Adolescents During the Covid-19 Pandemic

Birsen Yilmaz<sup>1</sup>, Makbule Gezmen Karadag<sup>2</sup>

<sup>1</sup>Department of Nutrition and Dietetics, Faculty of Health Sciences, Cukurova University, Adana, Turkey; <sup>2</sup>Department of Nutrition and Dietetics, Faculty of Health Sciences, Gazi University, Ankara, Turkey

**Abstract.** *Objective:* Body dissatisfaction is an increasing problem in adolescents, and it is thought that mindful eating and body image are related. These problems have become more serious during the pandemic period. This current study was carried out to examine the relationship between adolescents' mindful eating, body image, and anthropometric measurements during COVID-19 pandemic. *Methods:* A total of 200 adolescents (100 boys and 100 girls) aged 11-17 years, were involved in the study. The data were collected by the researcher using the face-to-face interview method through a questionnaire. The Mindful Eating Questionnaire was used to determine mindful eating. The Stunkard body image scale was employed to evaluate the body image of individuals, and all anthropometric measurements were made by the researcher in accordance with technique. *Results:* The mean age of the individuals was 14.2±2.04 years, and more than half (52%) attended high school. 60.0% of obese boys and 38.0% of obese girls considered themselves obese. A statistically significant difference was found depending on gender in terms of body perception ( $p < 0.05$ ). No significant difference was found between the mindful eating scores of participants according to their body perception ( $p > 0.05$ ). A negative statistically significant correlation was determined between the total mindful eating score of those who described themselves as underweight, overweight, and obese, and BMI ( $\text{kg}/\text{m}^2$ ), waist circumference (cm), hip circumference (cm), and body fat (%) ( $p < 0.05$ ). It was also found there were negative significant relationships between mindful eating subscales, anthropometric measurements, and BMI ( $p < 0.05$ ). *Conclusion:* It was concluded that body image in adolescents was affected by gender and BMI, and anthropometric measurements were associated with mindful eating.

**Key words:** adolescent, obesity, body image, body mass index, mindful eating

## Introduction

Obesity is a major public health issue that is increasing day by day. Especially due to the 2019 novel coronavirus (COVID-19) pandemic, the nutritional habits of both adults and adolescents have changed, and the level of physical activity has decreased compared to previous years, leading to an increase in body weight (1,2). It is known that the increase in body

weight of individuals is associated with body dissatisfaction. A positive relationship has been reported between body mass index (BMI) and body dissatisfaction in both women and men, and body satisfaction may vary depending on age. In this context, it is thought that mindful eating may have a positive impact on body perception (3,4).

In recent years, there has been an increasing body of literature on the relationship between mindfulness,

obesity and mindful eating. While the term mindfulness refers to being open to learning ability, accepting, and being present in the moment, mindful eating is defined as the maintenance of “non-judgmental awareness of physical and emotional feelings (of the person) while eating or in a food-related environment” (5,6). Mindful eating practices are generally applied to reduce the desire to eat, to provide portion control and body weight loss. Within this scope, mindful eating can have beneficial effects in the control of childhood obesity and body weight management (5). Body weight loss is not sustainable with diets with high energy restrictions, resulting in an inevitable body weight gain. Therefore, it is recommended that mindful eating should be a part of body weight management, especially for overweight and obese individuals (7).

It is reported that body weight and BMI are closely related to mindful eating (8). Not only the increase but also the decrease of the body mass index has a significant effect on mindful eating. It has been emphasized that as the BMI of individuals increases, they cannot pay attention to foods and internal signals in the organism (9). Therefore, mindful eating strategies have a critical role in the management of obesity and eating disorders in dietetic practices, and mindful eating can be a predictive factor for the success of body weight management (8).

In addition to being a disease that causes many complications and is associated with high morbidity and mortality, obesity is called a “pandemic” because of its increasing incidence worldwide (10). With the COVID-19 pandemic, which appeared towards the end of 2019 and affected the whole world at the beginning of 2020, a situation expressed as “dual pandemic conflict” was encountered (11). Obesity increases the severity of COVID-19 and the risk of death, including young patients (12,13). Besides, the restrictions imposed during the pandemic adversely affected the eating habits and physical activity level of individuals (14). This situation generally has negative outcomes on body weight gain and thus on body image (15).

To our knowledge, there is no study examining the relationship between eating awareness, body image, and anthropometric measurements in adolescents. Therefore, this study aimed to evaluate adolescents’

mindful eating, body image, and anthropometric measurements during the COVID-19 pandemic period.

## Method

This cross-sectional study was carried out with 200 voluntary adolescent individuals obese and 100 healthy, who were admitted to Ankara Bilkent City Hospital Children’s Hospital Pediatric Endocrinology Outpatient Clinic. Adolescents aged 11-17 years (obese group) diagnosed with obesity by the doctor, who did not have any additional diagnosis and agreed to participate in the study, and healthy adolescents who were not diagnosed with any disease by the pediatric endocrinology doctor (healthy group) were included in the study. The study protocol was reviewed by the Gazi University Clinical Research Ethics Committee and approved on 17.10.2019 with the report numbered 24074710-604.01.01-08.

The data of the study were collected (from June 2020 to January 2021) by the researcher using the face-to-face interview method through a questionnaire. The general characteristics of the participants (age, gender, level of education, parents’ level of education, etc.) and body image information were recorded using the questionnaire form. “Mindful Eating Questionnaire (MEQ-30)” was used to determine mindful eating.

The Mindful Eating Questionnaire consists of a total of 30 items. Five of these items were taken from the Mindful Eating Questionnaire (MEQ-28) unchanged, and the remaining items were inspired by the same scale. A five-point Likert scale (1: never, 2: rarely, 3: sometimes, 4: often, 5: always) was used. The scale has a total of 7 sub-factors: disinhibition/mindless eating (sub-factors; abstinence, quantity and time control), emotional eating (sub-factors; emotional hunger, eating for well-being and satisfaction), eating control (sub-factors; adjusting eating pace, keeping control of eating function), conscious nutrition (sub-factors; focusing on the taste of the food itself, taking a break from other activities and thoughts while eating), eating discipline (sub-factors; planning, preparation, balancing, possession, order, time), mindfulness (sub-factors; physical hunger-satiety, information on calories, nutritional value and healthy nutrition, awareness of habits)

and interference (sub-factors; being able to cope with sensory factors like smell, sight, sound, and distractions like an invitation, food variety or advertisement) (16).

The Stunkard Figure Rating Scale was used to evaluate the body perception of individuals. The scale allows individuals to evaluate their body shape subjectively and includes figures for both genders. There are 9 figures in total for each gender, and figures 1 and 2 refer to being underweight, figures 3 and 4 are normal, figures 5, 6 and 7 are overweight, and figures 8 and 9 obese. Within the scope of the study, nine body shapes representing the underweight, normal, overweight, obese groups in the scale were shown to all adolescents and asked how they considered themselves, and the body shape chosen was marked accordingly (17).

Anthropometric measurements of the participants in the study were made by the researcher [body weight (kg), height (cm), waist circumference (cm), hip circumference (cm)]. Body weights (kg) and body fat (%) of the participants were measured using the Tanita BC 601F Inner Scan (Scale™) device in the morning on an empty stomach with the lightest clothing. During the measurement, attention was paid that the adolescents should not have any metal or electronic items in contact with the body and that the female adolescents should not be in the menstrual period.

Statistical Package for the Social Sciences (SPSS 22.0) for Windows Evaluation Version was used for the statistical evaluation of the data. Statistical significance level was accepted as  $p < 0.05$  in all tests.

## Results

The descriptive characteristics of the participants are given in Table 1. A total of 200 voluntary adolescents ( $14.2 \pm 2.04$  years), 100 obese (50 boys, 50 girls), and 100 healthy (50 boys, 50 girls), participated in this study. The mean age of participants was  $13.6 \pm 1.64$  years for boys and  $14.9 \pm 2.21$  years for girls ( $p < 0.05$ ). 52%, 40%, and 8% of them attended high school, secondary school, and primary school, respectively. 33.5% of the mothers were primary school graduates, 30.5% were secondary school graduates, 31.5% of the fathers were secondary school graduates, and 30.5% were high school graduates. While 69% of mothers were not

working, 31% were working. Almost all the fathers were working (98%). 42.5% of the adolescents had a family history of obesity. 60.5% of them were eating at a normal pace ( $p < 0.05$ ), and the screen time (computer, television, mobile phone, etc.) was found to be 6.0 hours/day.

Table 2 shows the body perception distribution of individuals by gender. While 60.0% of obese boys considered themselves obese, this frequency was found to be 38.0% in girls. 56.0% of healthy boys expressed themselves as normal weight and 40.0% as underweight. More than half of the healthy girls (68.0%) rated themselves as normal weight and 38.0% as underweight. A statistically significant difference was found according to gender in terms of body perception ( $p < 0.05$ ).

Mindful eating scores based on participants' body perception are given in Table 3. Although the mindful eating scores of those who described themselves as normal weight were higher than the other participants ( $23.1 \pm 3.36$ ), there was no difference between the total mindful eating scores according to body images ( $p > 0.05$ ). A statistically significant difference was found between participants in terms of eating control scores, one of the mindful eating subscales, and it was seen between normal-weight individuals ( $3.7 \pm 0.90$ ) and overweight ( $3.1 \pm 0.94$ ) individuals ( $p < 0.05$ ).

Table 4 presents the relationship between mindful eating scores and anthropometric measurements according to the body perception of individuals. A negative statistically significant correlation was found between total mindful eating score and BMI ( $\text{kg}/\text{m}^2$ ), waist circumference (cm), hip circumference (cm), and body fat percentage measurement values in participants who viewed themselves as underweight, overweight, and obese ( $p < 0.05$ ). Besides, negative significant relationships were seen among mindful eating subscales, anthropometric measurements, and BMI ( $p < 0.05$ ). There was a negative significant relationship between anthropometric measurement and BMI values and eating control scores of the participants who described themselves as underweight or overweight ( $p < 0.05$ ). Disinhibition and emotional eating scores of those who viewed themselves as underweight were also found to be negatively related to anthropometric measurements and BMI values ( $p < 0.05$ ).

**Table 1.** Descriptive information of the participants

Descriptive information	Boys (n:100)		Girls (n:100)		Total (n:200)		$\chi^2$	p*
	n	%	n	%	n	%		
<b>Level of education</b>								
Primary school	11	11.0 <sup>a</sup>	5	5.0 <sup>a</sup>	16	8.0	24.238	<0.001
Secondary school	66	66.0 <sup>a</sup>	38	38.0 <sup>b</sup>	104	52.0		
High school	23	23.0 <sup>a</sup>	57	57.0 <sup>b</sup>	80	40.0		
<b>Maternal education level</b>								
Illiterate	2	2.0 <sup>a</sup>	3	3.0 <sup>a</sup>	5	2.5	14.508	0.013
Literate	3	3.0 <sup>a</sup>	4	4.0 <sup>a</sup>	7	3.5		
Primary school	27	27.0 <sup>a</sup>	40	40.0 <sup>a</sup>	67	33.5		
Secondary school	38	38.0 <sup>a</sup>	23	23.0 <sup>b</sup>	61	30.5		
High school	28	28.0 <sup>a</sup>	19	19.0 <sup>a</sup>	47	23.5		
University	2	2.0 <sup>a</sup>	11	11.0 <sup>b</sup>	13	6.5		
<b>Paternal education level</b>								
Literate	2	2.0	1	1.0	3	1.5	4.724	0.317
Primary school	14	14.0	22	22.0	36	18.0		
Secondary school	37	37.0	26	26.0	63	31.5		
High school	31	31.0	30	30.0	61	30.5		
University	16	16.0	21	21.0	37	18.5		
<b>Maternal employment status</b>								
Yes	34	34.0	28	28.0	62	31.0	1.178	0.278
No	66	66.0	72	72.0	138	69.0		
<b>Paternal employment status</b>								
Yes	99	99.0	97	97.0	196	98.0	1.020	0.312
No	1	1.0	3	3.0	4	2.0		
<b>Family history of obesity</b>								
Yes	43	43.0	42	42.0	85	42.5	0.020	0.886
No	57	57.0	58	58.0	115	57.5		
<b>Eating pace</b>								
Slow	4	4.0 <sup>a</sup>	16	16.0 <sup>b</sup>	20	10.0	19.190	<0.001
Normal	54	54.0 <sup>a</sup>	67	67.0 <sup>a</sup>	121	60.5		
Fast	42	42.0 <sup>a</sup>	17	17.0 <sup>b</sup>	59	29.5		
	<b>Median [Min-Max]</b>		<b>Median [Min-Max]</b>		<b>Median [Min-Max]</b>		<b>U</b>	<b>p</b>
<b>Screen time (hour/day)</b>	6.0 [0.0-16.0]		6.0 [1.0-13.0]		6.0 [0.0-16.0]		4669.0	0.415

p<0.05; Pearson- $\chi^2$  and Mann Whitney U Test \*Different letters indicate the difference between groups.

**Table 2.** Body perception distributions of individuals by gender

Gender	Body perception	Obese (n:100)		Healthy (n:100)		Total (n:200)		$\chi^2$	p*
		n	%	n	%	n	%		
Boys	Underweight	-	-	20	40.0	20	20.0 <sup>a</sup>	72.631	<0.001
	Normal	6	12.0	28	56.0	34	34.0 <sup>a,b</sup>		
	Overweight	14	28.0	1	2.0	15	15.0 <sup>b</sup>		
	Obese	30	60.0	1	2.0	31	31.0 <sup>a,b</sup>		
Girls	Underweight	-	-	19	38.0	19	19.0 <sup>a</sup>	65.395	<0.001
	Normal	12	24.0	31	62.0	43	43.0 <sup>a,b</sup>		
	Overweight	19	38.0	-	-	19	19.0 <sup>b</sup>		
	Obese	19	38.0	-	-	19	19.0 <sup>a,b</sup>		

p<0.05; Pearson- $\chi^2$  test \*Different letters indicate the difference between groups.

**Table 3.** Mindful eating scores of participants according to body perception

Body perception	Disinhibition	Emotional Eating	Eating Control	Conscious	Eating Discipline	Mindfulness	Interference	ME Total
Underweight	2.9±0.88	2.9±0.97	3.3±0.84 <sup>a</sup>	3.2±0.43	2.8±0.61	3.1±0.49	3.5±0.86	21.8±3.88
Normal	3.1±0.91	3.1±0.96	3.7±0.90 <sup>b</sup>	3.3±0.47	2.9±0.70	3.2±0.49	3.7±0.95	23.1±3.36
Overweight	2.8±0.82	2.9±0.82	3.1±0.94 <sup>a,b</sup>	3.1±0.39	2.9±0.71	3.2±0.45	3.7±0.82	21.9±2.84
Obese	2.9±0.88	3.2±1.11	3.5±0.81 <sup>a</sup>	3.2±0.38	2.9±0.76	3.1±0.59	3.8±0.90	22.7±3.73
Statistical analysis*	W:3.396 p: 0.335	W: 3.335 p: 0.343	W: 12.515 p: 0.006**	W: 1.745 p: 0.627	W: 1.277 p: 0.735	W: 0.491 p: 0.921	W: 4.744 p: 0.192	W: 5.062 p: 0.167

\*p<0.05; Kruskal Wallis test. ME: Mindful Eating \*\*Different letters indicate the difference between groups.

## Discussion

In this study, mindful eating, body image, and anthropometric measurements of adolescents during the COVID-19 pandemic were evaluated, and some comparisons were made based on the body image and gender of participants. Half of the participants were boys, and half were girls, with a mean age of 14.2±2.04 years.

Body mass index and gender have been reported to be the most significant factors influencing body dissatisfaction in adolescents (18). One of the main findings of the current study is that body image differs statistically significantly according to gender (p<0.05). While the ratio of girls who were normal weight and considered themselves as normal weight (62.0%) was

higher than boys (56.0%), the ratio of boys who were obese and describe themselves as obese (60.0%) was found to be higher than girls (38.0%). Although it is thought that gender is one of the major factors affecting body image and that women's body dissatisfaction level is higher than that of men, various studies report that women of similar ages with the same BMI have higher satisfaction levels than men (3,4). In a recent study, 1479 Turkish adolescents were examined, and boys were found to be more satisfied with their appearance than girls (p<0.001), which support the finding that the body image of individuals can vary based on gender, age, and body weight (19).

The relationship between body image and eating behavior is one of the research topics that has attracted

**Table 4.** The relationship between mindful eating scores and anthropometric measurements according to participants' body perception

Body perception	Disinhibition		Emotional Eating		Eating Control		Conscious		Eating Discipline		Mindfulness		Interference		ME Total	
	r	p	r	p	r	p	r	p	r	p	r	p	r	p	r	p
<b>Underweight</b>																
BMI (kg/m <sup>2</sup> )	-0.332	<b>0.039</b>	-0.379	<b>0.017</b>	-0.469	<b>0.003</b>	0.029	0.859	-0.337	<b>0.036</b>	-0.119	0.469	-0.096	0.563	-0.398	<b>0.012</b>
Waist circumference (cm)	-0.416	<b>0.008</b>	-0.531	<b>0.001</b>	-0.588	<b>0.000</b>	-0.062	0.710	-0.305	0.059	-0.284	0.079	-0.234	0.152	-0.533	<b>0.000</b>
Hip circumference (cm)	-0.380	<b>0.017</b>	-0.462	<b>0.003</b>	-0.597	<b>0.000</b>	0.068	0.682	-0.375	<b>0.019</b>	-0.150	0.361	-0.195	0.233	-0.502	<b>0.001</b>
Body fat percentage	-0.454	<b>0.004</b>	-0.472	<b>0.002</b>	-0.530	<b>0.001</b>	-0.133	0.421	-0.251	0.124	-0.253	0.120	-0.192	0.241	-0.498	<b>0.001</b>
<b>Normal</b>																
BMI (kg/m <sup>2</sup> )	-0.226	<b>0.048</b>	-0.225	<b>0.049</b>	-0.148	0.198	-0.166	0.150	0.108	0.350	0.190	0.098	-0.032	0.781	-0.127	0.273
Waist circumference (cm)	-0.226	<b>0.048</b>	-0.217	0.058	-0.236	<b>0.039</b>	-0.228	<b>0.046</b>	0.086	0.455	0.173	0.133	-0.080	0.487	-0.182	0.113
Hip circumference (cm)	-0.175	0.127	-0.242	<b>0.034</b>	-0.125	0.280	-0.147	0.202	0.164	0.155	0.168	0.144	-0.053	0.644	-0.111	0.338
Body fat percentage	-0.249	<b>0.029</b>	-0.293	<b>0.010</b>	-0.098	0.395	-0.216	0.059	0.237	<b>0.038</b>	0.160	0.166	-0.059	0.613	-0.134	0.245
<b>Overweight</b>																
BMI (kg/m <sup>2</sup> )	-0.221	0.210	-0.169	0.338	-0.568	<b>0.000</b>	0.426	<b>0.012</b>	-0.099	0.577	-0.232	0.186	-0.223	0.205	-0.378	<b>0.027</b>
Waist circumference (cm)	-0.210	0.234	-0.161	0.362	-0.648	<b>0.000</b>	0.323	0.063	-0.114	0.522	-0.201	0.253	-0.109	0.539	-0.383	<b>0.026</b>
Hip circumference (cm)	-0.285	0.102	-0.124	0.485	-0.594	<b>0.000</b>	0.291	0.096	0.005	0.977	-0.187	0.289	-0.161	0.362	-0.366	<b>0.033</b>
Body fat percentage	-0.244	0.164	-0.227	0.197	-0.545	<b>0.001</b>	0.257	0.142	-0.044	0.804	-0.331	0.056	-0.131	0.462	-0.371	<b>0.031</b>
<b>Obese</b>																
BMI (kg/m <sup>2</sup> )	-0.335	<b>0.017</b>	-0.277	0.051	-0.464	<b>0.001</b>	0.072	0.619	0.008	0.955	-0.112	0.438	-0.190	0.185	-0.344	<b>0.014</b>
Waist circumference (cm)	-0.448	<b>0.001</b>	-0.348	<b>0.013</b>	-0.456	<b>0.001</b>	-0.021	0.883	-0.125	0.388	-0.218	0.129	-0.243	0.090	-0.461	<b>0.001</b>
Hip circumference (cm)	-0.379	<b>0.007</b>	-0.272	0.056	-0.533	0.000	0.051	0.726	0.008	0.954	-0.138	0.339	-0.275	0.053	-0.421	<b>0.002</b>
Body fat percentage	-0.282	<b>0.047</b>	-0.467	<b>0.001</b>	-0.389	0.005	-0.124	0.389	-0.053	0.714	-0.075	0.607	-0.159	0.271	-0.401	<b>0.004</b>

p&lt;0.05; Spearman correlation test. ME: Mindful Eating

researchers' attention recently. Body dissatisfaction is regarded as a risk factor for eating disorders, especially in obese individuals (20). In parallel, it has been shown that the relationship between intuitive eating and body perception is strongest in individuals with healthy body weight, and this relationship decreases as BMI increases (21).

Body dissatisfaction and negative affectivity are among the risk factors associated with eating behaviors. Although mindfulness-based interventions are effective in the treatment of eating disorders, the effects of mindfulness training on the basic features of eating disorders have not yet been fully explored (22). It is thought that body dissatisfaction can be improved by encouraging individuals not to judge through awareness (23). Being more aware of thoughts and feelings can reduce the likelihood of negative self-evaluation, which may reduce the occurrence of subsequent disordered eating urges and behaviors (24). In the current study, mindful eating was evaluated according to the body image of adolescents. Although there was no statistically significant difference between participants' total mindful eating scores ( $p > 0.05$ ), the mindful eating scores of those who considered themselves as normal weight were found to be relatively higher than the others. In addition, a statistically significant difference was found between eating control scores, one of the mindful eating subscales, which was observed between normal weight and overweight participants ( $p < 0.05$ ). While adolescents with normal weight have higher eating control scores, overweight participants have lower eating control scores. A study conducted with university students (362 participants aged 18-31) revealed that as the scores of eating attitudes and behaviors increased, social appearance anxiety increased (25). Overeating or undereating leads to changes in body weight, body composition, and thus body shape. Overthinking these changes can cause body weight-related concerns, and one of these concerns about body weight is body dissatisfaction (26). In this context, the fact that the participants who considered themselves as normal weight in the current study had relatively higher mindful eating shows parallelism with these hypotheses.

The relationship between the participants' mindful eating scores according to their body perception

and anthropometric measurements was also examined in this study. A negative statistically significant correlation was found between the total mindful eating score of individuals who rated themselves as underweight, overweight, and obese, and the values of BMI ( $\text{kg}/\text{m}^2$ ), waist circumference (cm), hip circumference (cm), and body fat percentage ( $p < 0.05$ ). As the mindful eating scores of participants increases, BMI and obesity-related anthropometric measurements decrease. Similarly, in a study conducted with 400 university students aged between 18-26 years, a negative correlation was found between their mindful eating scores and BMI (7). Another relevant study demonstrated that mindful eating scores were significantly lower in obese women (27). On the other hand, Anderson et al. (2016) found no relationship between BMI and mindful eating (28). In a study with 250 individuals aged between 19-45 years, a negative significant relationship was observed between mindful eating and anthropometric measurements and BMI, in parallel with the current study. Besides, a negative significant relationship was reported between disinhibition and eating control in the subscales of mindful eating and BMI, body weight, waist circumference, and waist-hip ratio (29). Similarly, in the current study, negative significant relationships were found between mindful eating subscales and BMI and anthropometric measurements. These findings both show that anthropometric measures are closely related to mindful eating and support that they can be an indicator for mindful eating.

Due to the COVID-19 pandemic, many changes have occurred in the lifestyle of adolescents. While eating habits have changed negatively, physical activity levels have also decreased. The main reasons for these consequences are the implementation of the curfew and online education which have become the major risk factors for adolescent body weight gain (30). The increase in body weight affects the body image of individuals besides it can cause more serious health effects. Regardless of age, obesity is reported as one of the most important risk factors for COVID-19 (31). During the pandemic, it has been reported that there has been an increase in adolescent body weight due to similar reasons in many countries such as China, many US states, Spain and Italy. While obesity rates are already high, this situation has become more serious with the

pandemic. Studies have generally focused on changes in adolescents' eating behaviours and physical activity (32-35). In the current study, different from the literature, individuals' body image, eating awareness and its relationship with obesity are discussed, as well as, as mentioned above, statistically significant relationships were determined.

The current study has some limitations. Firstly, it was a cross-sectional study which has focused on the data of adolescents during the pandemic period. It is recommended to examine the findings of other periods as well. In addition, the data were collected only from adolescents in Ankara. It would be a good approach to study adolescents from other cities as well as rural regions.

## Conclusion

The relationship between mindful eating, body image and obesity has recently become one of the topics that researchers frequently focus on. Especially mindful eating and anthropometric measurements can directly affect the self-esteem of individuals by affecting body perception. Low mindful eating and body dissatisfaction are thought to be closely related to eating disorders. Therefore, in addition to its contribution to obesity, it is essential to increase mindful eating and body satisfaction for the improvement of eating behaviors. This present study showed that adolescents' body perceptions varied depending on current body weight and gender, and when classified according to body perception, total mindful eating score and subscales in all groups were found to be associated with anthropometric measurements and BMI. It has been shown in this study that girls are more obsessed with body image than boys and that especially girls with high body weight express their body image differently. In this context, it is thought that it may be more effective to pay attention to this issue in diet programs for adolescents and to work with a psychologist when necessary. On the other hand, during the COVID-19 pandemic, the problems related to body weight and body image have even increased. In particular, the closure of schools and the curfew affected the physical activity level of adolescents. Therefore, it is important that childhood obesity

prevention strategies remain a priority during the pandemic. It is recommended that future studies investigate the effective factors on mindful eating, obesity and body image in larger groups in more detail.

**Acknowledgement:** None.

**Conflict of interest:** No potential conflict of interest relevant to this article was reported by the authors.

**Funding disclosure:** None.

## References

1. Pietrobelli A, Pecoraro L, Ferruzzi A, et al. Effects of COVID-19 Lockdown on Lifestyle Behaviors in Children with Obesity Living in Verona, Italy: A Longitudinal Study. *Obesity (Silver Spring)* 2020;28(8):1382-5.
2. Robinson E, Boyland E, Chisholm A, et al. Obesity, eating behavior and physical activity during COVID-19 lockdown: A study of UK adults. *Appetite* 2021;156:104853.
3. Pingitore R, Spring B, Garfield D. Gender differences in body satisfaction. *Obes Res* 1997;5(5):402-9.
4. Quittkat HL, Hartmann AS, Dusing R, Buhlmann U, Vocks S. Body Dissatisfaction, Importance of Appearance, and Body Appreciation in Men and Women Over the Lifespan. *Front Psychiatry* 2019;10:864.
5. Dunn C, Haubenreiser M, Johnson M, et al. Mindfulness Approaches and Weight Loss, Weight Maintenance, and Weight Regain. *Curr Obes Rep* 2018;7(1):37-49.
6. Sojcher R, Gould Fogerite S, Perlman A. Evidence and potential mechanisms for mindfulness practices and energy psychology for obesity and binge-eating disorder. *Explore (NY)* 2012;8(5):271-6.
7. Köse G, ME. Ç. Mindful eating questionnaire: eating control, emotional eating and conscious nutrition trio: Mindful Eating Eating Control, Emotional Eating, Conscious Nutrition. *Progr Nutr* 2020;22(2):555-61.
8. Fung TT, Long MW, Hung P, Cheung LW. An Expanded Model for Mindful Eating for Health Promotion and Sustainability: Issues and Challenges for Dietetics Practice. *J Acad Nutr Diet* 2016;116(7):1081-6.
9. Mason AE, Epel ES, Kristeller J, et al. Effects of a mindfulness-based intervention on mindful eating, sweets consumption, and fasting glucose levels in obese adults: data from the SHINE randomized controlled trial. *J Behav Med* 2016;39(2):201-13.
10. Chua MWJ. Managing patients with obesity in the post COVID-19 world: Time to sharpen the saw. *Obes Res Clin Pract* 2021;15(1):85-8.



11. Chua MWJ, Zheng S. Obesity and COVID-19: The clash of two pandemics. *Obes Res Clin Pract* 2020;14(4):380-2.
12. David A Kass, Priya Duggal, Cingolani. O. Obesity could shift severe COVID-19 disease to younger ages. *Lancet* 2020;395(10236):1544-5.
13. Lighter J, Phillips M, Hochman S, et al. Obesity in Patients Younger Than 60 Years Is a Risk Factor for COVID-19 Hospital Admission. *Clin Infect Dis* 2020;71(15):896-7.
14. Koletzko B, Holzapfel C, Schneider U, Hauner H. Lifestyle and Body Weight Consequences of the COVID-19 Pandemic in Children: Increasing Disparity. *Ann Nutr Metab* 2021;1-3.
15. Robertson M, Duffy F, Newman E, Prieto Bravo C, Ates HH, Sharpe H. Exploring changes in body image, eating and exercise during the COVID-19 lockdown: A UK survey. *Appetite* 2021;159:105062.
16. Köse G, Tayfur M, Birincioğlu İ, A. D. Yeme Farkındalığı Ölçeği'ni Türkçeye Uyarlama Çalışması. *Bilişsel Davranışçı Psikoterapi ve Araştırmalar Dergisi* 2016;3:125-34.
17. Bays HE, Bazata DD, Fox KM, et al. Perceived body image in men and women with type 2 diabetes mellitus: correlation of body mass index with the figure rating scale. *Nutr J* 2009;8:57.
18. Fernandez-Bustos JG, Infantes-Paniagua A, Gonzalez-Marti I, Contreras-Jordan OR. Body Dissatisfaction in Adolescents: Differences by Sex, BMI and Type and Organisation of Physical Activity. *Int J Environ Res Public Health* 2019;16(17).
19. Bulduk E Özgür, Bulduk S, G. Ö. Assessment of eating attitudes and body satisfaction among high school adolescents in Turkey. *Progr Nutr* 2018;20(2):205-11.
20. Beintner I, Emmerich OLM, Vollert B, Taylor CB, Jacobi C. Promoting positive body image and intuitive eating in women with overweight and obesity via an online intervention: Results from a pilot feasibility study. *Eat Behav* 2019;34:101307.
21. Keirns NG, Hawkins MAW. The relationship between intuitive eating and body image is moderated by measured body mass index. *Eating Behaviors* 2019;33:91-6.
22. Keng S-L, Ang Q. Effects of Mindfulness on Negative Affect, Body Dissatisfaction, and Disordered Eating Urges. *Mindfulness* 2019;10(9):1779-91.
23. Dijkstra P, Barelds DP. Examining a model of dispositional mindfulness, body comparison, and body satisfaction. *Body Image* 2011;8(4):419-22.
24. Wade T, George WM, Atkinson M. A randomized controlled trial of brief interventions for body dissatisfaction. *J Consult Clin Psychol* 2009;77(5):845-54.
25. Çakıroğlu D, Ömer EH, C. A. Üniversite Öğrencilerinin Yeme Tutumu, Yeme Farkındalığı ve Sosyal Görünüş Kaygısının Değerlendirilmesi (Siirt İli Örneği). *Beden Eğitimi ve Spor Bilimleri Dergisi* 2020;14(1):1-12.
26. Ogden J. *The Psychology of Eating: From Healthy to Disordered Behavior*. 2nd edition. Oxford, England: Wiley-Blackwell; 2010.
27. Framson C, Kristal AR, Schenk JM, Littman AJ, Zeliadt S, Benitez D. Development and validation of the mindful eating questionnaire. *J Am Diet Assoc* 2009;109(8):1439-44.xc v
28. Anderson LM, Reilly EE, Schaumberg K, Dmochowski S, Anderson DA. Contributions of mindful eating, intuitive eating, and restraint to BMI, disordered eating, and meal consumption in college students. *Eat Weight Disord* 2016;21(1):83-90.
29. Özkan N, Bilici S. Are anthropometric measurements an indicator of intuitive and mindful eating? *Eat Weight Disord* 2021;26(2):639-48.
30. Stavridou A, Kapsali E, Panagouli E, et al. Obesity in children and adolescents during COVID-19 pandemic. *Children (Basel)* 2021 Feb 12;8(2):135.
31. Ribeiro KDDS, Garcia LRS, Dametto JFDS, Assunção DGF, Maciel BLL. COVID-19 and nutrition: The need for initiatives to promote healthy eating and prevent obesity in childhood. *Child Obes* 2020 Jun;16(4):235-237.
32. Yang S, Guo B, Ao L, Yang C, Zhang L, Zhou J, Jia P. Obesity and activity patterns before and during COVID-19 lockdown among youths in China. *Clin Obes* 2020 Dec;10(6):e12416.
33. Dutta Mou. COVID-19 and impact of school closures on the children of the United States; a point of view with an empirical analysis. Available at SSRN: <https://ssrn.com/abstract=3596096> or <http://dx.doi.org/10.2139/ssrn.3596096>.
34. Di Renzo L, Gualtieri P, Pivari F, et al. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *J Transl Med* 2020 Jun 8;18(1):229.
35. Fernandez-Rio J, Cecchini JA, Mendez-Gimenez A, Carriedo A. Weight changes during the COVID-19 home confinement. Effects on psychosocial variables. *Obes Res Clin Pract* 2020 Jul-Aug;14(4):383-385.

### Correspondence

Birsen Yilmaz

Cukurova University Faculty of Health Sciences, Department of Nutrition and Dietetics, Adana/Turkey

E-mail: dytbirsen@gmail.com

Fax: +90 (312) 216 26 36