



## Research

# Opposite ends of the spectrum: Do emotional eating and restraint eating present barriers to applying mindful eating and intuitive eating strategies?

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## Objective

We aimed to evaluate the relationship between intuitive eating, mindful eating, emotional eating and dietary restraint behaviors and the role of gender in these relationships.

## Material and Method

This study was conducted with 522 participants aged 18-65. Questionnaire about sociodemographic characteristics and general eating habits, Intuitive Eating Scale-2 (IES-2), Mindful Eating Questionnaire-30 (MEQ-30), and Emotional Eating and Restraint Eating Subscale of Dutch Eating Behavior Questionnaire (DEBQ) were administered to the participants.

## Results

DEBQ Restraint Eating, and Emotional Eating subscale scores were found to be higher in women. The total scores of IES-2 and MEQ-30 were found to be higher in the group with Body Mass Index (BMI)<25, and the DEBQ Emotional Eating subscale score was found to be higher in the group with BMI≥25. The negative correlation between DEBQ Emotional Eating subscale score and IES-2 total score was weak in men and strong in women. The negative relationship between MEQ-30 total score and DEBQ Emotional Eating subscale score was moderate in men and strong in women. We found that gender had a moderator role between IES-2 and MEQ-30 total scores and between MEQ-30 total score and DEBQ Emotional Eating score.

## Conclusion

Overweight and obese participants had lower levels of intuitive eating and mindful eating, while emotional eating levels were higher. Mindful eating and intuitive eating strategies may be concepts that represent two opposite ends of a spectrum with emotional eating, and emotional eating can be an obstacle when these strategies are administered, especially in women.

## INTRODUCTION

In recent years, it has been reported that eating disorders have increased with obesity and this situation is associated with increased mortality (Darby et al. 2009; Smink, van Hoeken, and Hoek 2013; Galmiche et al. 2019; Nagata et al. 2018; van Hoeken and Hoek 2020). It is important to investigate the mechanisms behind eating disorders and to offer solutions.

The role of restraint eating, emotional eating, intuitive eating, and mindful eating in this pathology is discussed in the current literature. The concept of intuitive eating, introduced by Tribole and Resch in 1995 (Tribole and Resch 1995), is defined as feeding in response to hunger and satiety by adhering to internal signals (Tribole and Resch 2012). Mindful eating expresses the state of eating by being aware of internal cues and emotional states and perceiving these hunger and satiety signals given by the body (Dalen

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et al. 2010). Restraint eating is defined as ‘the tendency to restrict food intake consciously in order to maintain body weight or to promote weight loss’ (Westenhoefer 1991). In recent years, the increase in obesity prevalence and social media exposures have changed the perception of body image in the society and have led people to make changes in food choices and restraint eating behaviors (Rounsefel et al., 2020; Houben, Nederkoorn, and Jansen 2012). Emotional eating is when people increase or decrease their food consumption in response to their emotional state (Canetti, Bachar, and Berry 2002). While studies emphasize the role of mindful eating and intuitive eating strategies in the prevention and treatment of both eating disorders and obesity (Camilleri et al. 2016; Denny, Loth, Eisenberg, et al. 2013; Hepworth 2010), they report that emotional eating and restraint eating may also be risk factors for these pathologies (Andrés and Saldaña 2014).

When these eating behaviors are evaluated on the basis of gender it is reported that men are more dependent on their internal signals than women, that is, they are more prone to intuitive eating behavior, while women show more restraint eating and emotional eating behavior than men (Goldfield and Lumb 2008; Larsen et al. 2006; T. S. Smith and Hawks 2006).

It is important to evaluate these relationships on the basis of gender in order to evaluate the relationship between these eating behavior patterns and to give more specific recommendations. We hypothesized that mindful eating and intuitive eating were inversely related to emotional eating and restraint eating, and that the strength of this relationship was different for the genders.

The aim of this study is to evaluate the relationship between intuitive eating, mindful eating, restraint eating and emotional eating. It is also aimed to evaluate the moderator role of gender in these relations in order to give more specific suggestions on the basis of gender.

## METHODS

### PARTICIPANTS

This cross-sectional study was conducted between March 26, 2021 and April 12, 2021. The study was conducted online and participants were invited to the study via social networks. Participants aged 18-65 years and volunteered to participate in this study were included in the study. The sample size of the study was calculated as 262 with 95% test power,  $\alpha=0.05$  margin of error, considering the studies on this issue in order to reveal the relationship between the scale scores (Kerin, Webb, and Zimmer-Gembeck 2019; J. M. Smith et al. 2020) and was completed with 522 participants. The Ethics Committee on Medical Research of Acibadem Mehmet Ali Aydinlar University approved the study (ATADEK 2021/05) and informed consent was obtained from participants before starting the research.

### STUDY DESIGN

A questionnaire about sociodemographic characteristics and general eating habits, IES-2, MEQ-30 and Emotional Eating and Restraint Eating Subscale of the DEBQ was used.

### SOCIODEMOGRAPHIC CHARACTERISTICS

A questionnaire was used to obtain information about sociodemographic characteristics general eating habits and anthropometric measurements. Body weight and height information were obtained from the participants and BMI ( $\text{kg}/\text{m}^2$ ) was calculated using these data. BMI was categorized using the World Health Organization’s BMI classification (WHO n.d.).

### INTUITIVE EATING SCALE-2 (IES-2)

IES-2 was used to evaluate participants’ intuitive eating levels. IES-2 (Tylka and Kroon Van Diest 2013) is an improved version of the Intuitive Eating Scale previously prepared by Tylka (Tylka 2006). It consists of four subscales: eating for physical rather than emotional reason, reliance on hunger and satiety cues, unconditional permission to eat, and body food choice congruence (Bas et al. 2017). The Turkish validity and reliability study of IES-2 was conducted by Baş et al. As in the original scale, this scale consists of 23 items and 4 subscales. The questions are scored as a 5-point Likert type scale ranging from “Strongly Disagree” to “Strongly Agree”. The higher the total score and the subscale scores, the higher the intuitive eating level (Bas et al. 2017).

### MINDFUL EATING QUESTIONNAIRE-30 (MEQ-30)

MEQ-30, developed by Framson et al. (Framson et al. 2009), was used to assess participants’ mindful eating levels. The Turkish adaptation of MEQ was carried out by Köse et al. This 30-item adapted scale includes 7 sub-factors: mindfulness, conscious nutrition, eating control, eating discipline, disinhibition, emotional eating, and interference. Each item in this questionnaire is evaluated on a 5-point Likert-type scale ranging from Never (1) to Always (5). An increase in the questionnaire score indicates an increase in the level of mindful eating (Köse, Tayfur, and Birincioğlu 2016).

### DUTCH EATING BEHAVIOR QUESTIONNAIRE (DEBQ)

Emotional eating and restraint eating behaviors of the participants were evaluated with DEBQ, developed by Van Strien et al. (Strien T, JER, and GPA 1986). The Turkish validity and reliability study of this questionnaire was conducted by Bozan et al. The adapted scale consists of 33 items, and 3 factors: external eating, restrictive eating, and emotional eating, as in the original. Scale scoring is done on a 5-point Likert type scale ranging from ‘Never (1) to ‘Very often (5)’. Although there is no scoring for the total score of the scale, the increase in each subscale score shows that the person reflects that feature (Bozan, Baş, and Aşçı 2009).

**Table 1. Characteristics of Participants**

	Woman (n=397)		Man (n=125)	
	$\bar{x} \pm SD$	Min-Max	$\bar{x} \pm SD$	Min-Max
Age (year)*	29.47±8.81	18.00-63.00	33.04±10.44	19.00-62.00
Weight (kg)**	62.8± 11.99	40.00-112.00	81.35±14.77	50.00-133.50
BMI (kg/m <sup>2</sup> )	23.47±4.38	16.46-42.87	26.15±4.76	16.33-43.10
BMI Classification	n	Percentage (%)	n	Percentage (%)
Underweight	27	6.8	3	2.4
Normal Weight	258	65.0	51	40.8
Overweight	80	20.1	49	39.2
Obesity Class I	23	5.8	14	11.2
Obesity Class II	8	2.0	7	5.6
Obesity Class III	1	0.3	1	0.8

\*Mann Whitney U Test,  $p < 0.05$ , \*\*Mann Whitney U Test,  $p < 0.01$

## STATISTICAL ANALYSIS

Statistical analyzes were performed with the IBM Statistical Package for Social Sciences (SPSS) version 26.0 (SPSS, 2019) and PROCESS MACRO was used to test for moderator effects. The categorical data obtained were summarized with numbers and percentages, and quantitative variables were summarized with mean, standard deviation, minimum and maximum statistics. The conformity of the data to the normal distribution was tested with Shapiro-Wilk. Although the Shapiro-Wilk test is generally used in smaller samples ( $n < 50$ ), it is stated that it is suitable for larger samples (Mishra et al. 2019). Considering this situation, the normality of the data was evaluated. Homogeneity of variances was tested with Levene's test. Comparisons of two independent groups were tested with the t-test or its non-parametric equivalent, and comparisons of more than two independent groups were tested with analysis of variance (ANOVA) and Welch ANOVA in cases where the homogeneity of variance assumption could not be met. The relationships between quantitative variables were measured with the Pearson Correlation coefficient. The correlation coefficient between 0.20-0.40 was evaluated as weak, 0.40-0.60 moderate, and 0.60-0.80 strong (Yang and He 2022). Estimation models for scale scores were constructed as interactive models with moderator effects. Statistical significance level was accepted as 5% in all analyzes.

## RESULTS

Of the participants, 24% ( $n=125$ ) were man and 76% ( $n=397$ ) were woman. Mean age of men ( $33.04 \pm 10.44$ ) was higher than women ( $29.47 \pm 8.81$ ) ( $p < 0.05$ ). 56.8% of men and 28.2% of women were in the group with  $BMI \geq 25$ . The men's ( $26.15 \pm 4.76$ ) mean BMI was higher ( $p < 0.01$ ). (Table 1).

The genders were found to be similar in terms of IES-2 ( $p=0.197$ ) and MEQ-30 ( $p=0.847$ ) total scores. However, it was found that restraint eating and emotional eating scores of women were higher than those of men. (Table 2).

Participants with  $BMI < 25$  had higher IES-2 and MEQ-30 total scores than participants with  $BMI \geq 25$ . On the other hand, DEBQ emotional eating subscale score was found to be lower in participants with  $BMI < 25$  (Table 3).

A negative and weak correlation was found between BMI and IES-2 total score ( $r = -.240$ ) and MEQ-30 total score ( $r = -.265$ ) ( $p < 0.01$ ). On the other hand, a very weak positive correlation was determined between BMI and DEBQ Restraint Eating subscale score ( $r = 0.110$ ,  $p < 0.05$ ) and DEBQ Emotional Eating subscale score ( $r = 0.163$ ,  $p < 0.01$ ) (Table 4).

A moderate positive correlation was found between the total score of IES-2 and the total score of MEQ-30 ( $r = .514$ ,  $p < 0.01$ ). There was a moderate inverse relationship between the IES-2 total score and the DEBQ emotional eating subscale ( $r = -.533$ ,  $p < 0.01$ ), while a very weak negative correlation was found between the IES-2 total score and the DEBQ restraint eating subscale ( $r = .090$ ,  $p < 0.05$ ).

There was moderate negative correlation between the MEQ-30 total score and the DEBQ emotional eating subscale ( $r = -.598$ ,  $p < 0.01$ ), but no significant relationship was found with the DEBQ restraint eating subscale (Table 5).

When the relationships examined for men, it was found that there was a weak positive correlation between the IES-2 total score and the MEQ-30 total score, and a weak negative correlation between the IES-2 total score and the DEBQ emotional eating subscale score. In addition, a moderately inverse relationship was found between the MEQ-30 total score and the DEBQ Emotional Eating subscale score (Table 5).

When the relationships examined for women, it was found that there was a strong positive correlation between the IES-2 total score and the MEQ-30 total score, and a strong negative correlation between the IES-2 total score and the DEBQ Emotional Eating subscale score. There was strong negative correlation was found between the MEQ-30 total score and the DEBQ Emotional Eating subscale score (Table 5).

The interaction effect was found to be significant when the moderation analysis was performed with MEQ-30 total score and gender for estimation of the IES-2 total score ( $p = 0.013$ ). It was determined that gender explained 27.7%

**Table 2. Scale Scores By Gender**

	Woman (n= 397)	Man (n=125)	t	P value*
<b>IES-2 Total Score</b>	3.36±0.63	3.44±0.73	-1.291	0.197
Unconditional Permission to Eat	3.30±0.68	3.41±0.72	-1.565	0.118
Eating For Physical Rather Than Emotional Reasons	3.27±1.03	3.58±0.9	-3.070	<b>0.002</b>
Reliance on Hunger and Satiety Cues	3.40±1.02	3.35±1.2	0.457	0.648
Body Food Choice Congruence	3.62±1.03	3.33±1.24	2.360	<b>0.019</b>
<b>MEQ-30 Total Score</b>	3.36±0.52	3.35±0.4	0.193	0.847
Disinhibition	3.28±0.92	3.38±0.83	-1.247	0.214
Emotional Eating	3.30±1.1	3.85±0.94	-5.528	<b>&lt;0.001</b>
Eating Control	3.74±0.95	3.46±0.83	3.181	<b>0.002</b>
Mindfulness	3.21±0.4	3.11±0.4	2.278	<b>0.023</b>
Eating Discipline	3.40±0.81	3.03±0.83	4.431	<b>&lt;0.001</b>
Conscious Nutrition	3.26±0.56	3.14±0.53	2.130	<b>0.034</b>
Interference	3.50±0.87	3.54±0.9	-0.516	0.606
<b>DEBQ</b>				
Restraint Eating	2.88±0.86	2.51±0.88	4.224	<b>&lt;0.001</b>
Emotional Eating	2.35±1.23	1.84±0.94	4.898	<b>&lt;0.001</b>

\*Independent Samples t Test

IES-2: Intuitive Eating Scale-2, MEQ-30: Mindful Eating Questionnaire, DEBQ: Dutch Eating Behavior Questionnaire

**Table 3. Scale Scores By BMI**

BMI Groups	<25 (n=339)	≥25 (n=183)	t	p*
<b>IES-2 Total Score</b>	3.46±0.66	3.22±0.62	4.039	<b>&lt;0.001</b>
Unconditional Permission to Eat	3.33±0.7	3.32±0.68	0.231	0.817
Eating For Physical Rather Than Emotional Reasons	3.45±1	3.14±1	3.331	<b>0.001</b>
Reliance on Hunger and Satiety Cues	3.49±1.06	3.21±1.05	2.882	<b>0.004</b>
Body Food Choice Congruence	3.7±1.03	3.27±1.14	4.243	<b>&lt;0.001</b>
<b>MEQ-30 Total Score</b>	3.44±0.47	3.21±0.51	4.976	<b>&lt;0.001</b>
Disinhibition	3.42±0.86	3.08±0.93	4.239	<b>&lt;0.001</b>
Emotional Eating	3.5±1.05	3.29±1.16	2.058	<b>0.040</b>
Eating Control	3.85±0.88	3.35±0.92	6.135	<b>&lt;0.001</b>
Mindfulness	3.17±0.38	3.21±0.44	-1.212	0.226
Eating Discipline	3.42±0.83	3.11±0.79	4.170	<b>&lt;0.001</b>
Conscious Nutrition	3.29±0.55	3.12±0.55	3.251	<b>0.001</b>
Interference	3.53±0.85	3.46±0.94	0.843	0.400
<b>DEBQ</b>				
Restraint Eating	2.77±0.9	2.84±0.82	-0.880	0.379
Emotional Eating	2.14±1.13	2.4±1.27	-2.376	<b>0.018</b>

\*Independent Samples t Test

IES-2: Intuitive Eating Scale-2, MEQ-30: Mindful Eating Questionnaire, DEBQ: Dutch Eating Behavior Questionnaire

of the relationship between mindful eating and intuitive eating ( $R\text{-sq}=0.277$ ) (Table 6).

While the effect of the low levels of the MEQ-30 total score on the IES-2 total score was lower in women than in men, the effect at moderate levels was similar, and the effect of high levels was higher in women than in men (Figure 1).

The interaction effect was found to be significant when the moderation analysis were performed with DEBQ Emotional Eating score and gender for estimation of the MEQ-30 total score ( $p=0.013$ ). It was determined that gender explained 37.9% of the relationship between MEQ-30 total score and DEBQ Emotional Eating score ( $R\text{-sq}=0.379$ ) (Table 6).

**Table 4. Correlation Between BMI and Scale Scores**

	BMI (kg/m <sup>2</sup> )
<b>IES-2 Total Score</b>	<b>-.240**</b>
Unconditional Permission to Eat	-.099*
Eating For Physical Rather Than Emotional Reasons	-.179**
Reliance on Hunger and Satiety Cues	-.174**
Body Food Choice Congruence	-.199**
<b>MEQ-30 Total Score</b>	<b>-.265**</b>
Disinhibition	-.233**
Emotional Eating	-.120**
Eating Control	-.334**
Mindfulness	.039
Eating Discipline	-.172**
Conscious Nutrition	-.131**
Interference	-.071
<b>DEBQ</b>	
Restraint Eating	.110*
Emotional Eating	.163**

\*p&lt;0.05; \*\*p&lt;0.01

IES-2: Intuitive Eating Scale-2, MEQ-30: Mindful Eating Questionnaire, DEBQ:Dutch Eating Behavior Questionnaire

**Table 5. Correlations Between Scale Scores in All Participants, Men and Women**

<b>All Participants</b>				
	1	2	3	4
1.IES-2 Total Score	1			
2. MEQ-30 Total Score	.514**	1		
3.DEBQ Restraint Eating	-.090*	0.081	1	
4.DEBQ Emotional Eating	-.533**	-.598**	.224**	1
*p<0.05; **p<0.01				
<b>Man</b>				
Scale Score	1	2	3	4
1.IES-2 Total Score	1			
2. MEQ-30 Total Score	.216*	1		
3.DEBQ Restraint Eating	-0.09	0.069	1	
4.DEBQ Emotional Eating	-.284**	-.405**	.282**	1
*p<0.05; **p<0.01				
<b>Woman</b>				
Scale Score	1	2	3	4
1. IES-2 Total Score	1			
2. MEQ-30 Total Score	.608**	1		
3. DEBQ Restraint Eating	-0.078	0.084	1	
4. DEBQ Emotional Eating	-.611**	-.647**	.178**	1
*p<0.05; **p<0.01				

IES-2: Intuitive Eating Scale-2, MEQ-30: Mindful Eating Questionnaire, DEBQ:Dutch Eating Behavior Questionnaire

While the effect of DEBQ Emotional Eating at low levels on the total score of MEQ-30 is higher in women than in men, the difference between genders decreases at moderate levels and decreases to almost similar levels at high levels (Figure 2).

## DISCUSSION

This study showed that the relationship between intuitive eating, mindful eating, dietary restraint, and emotional

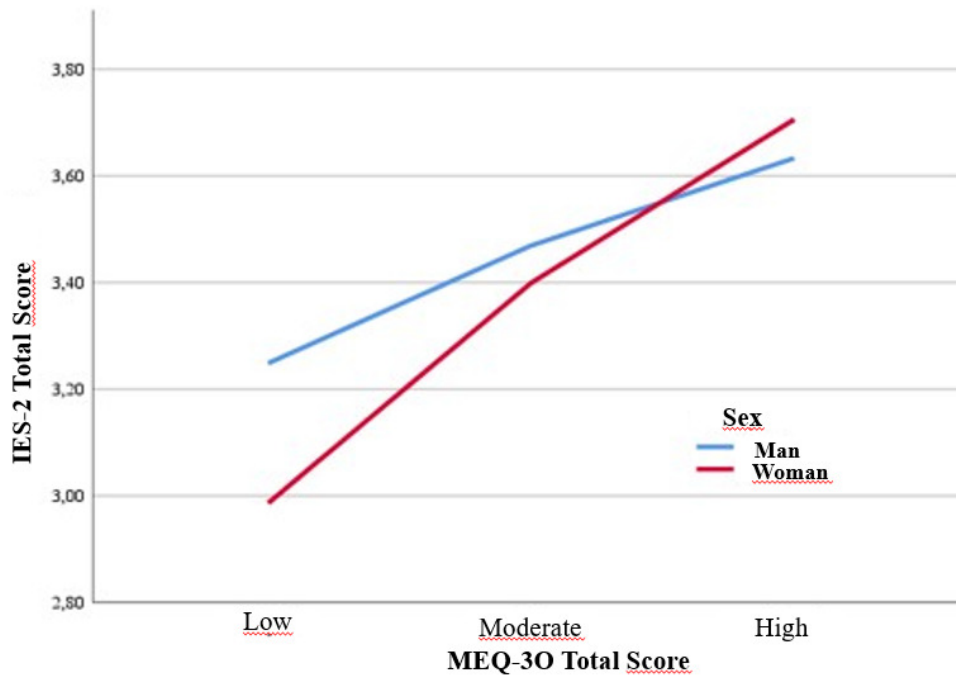


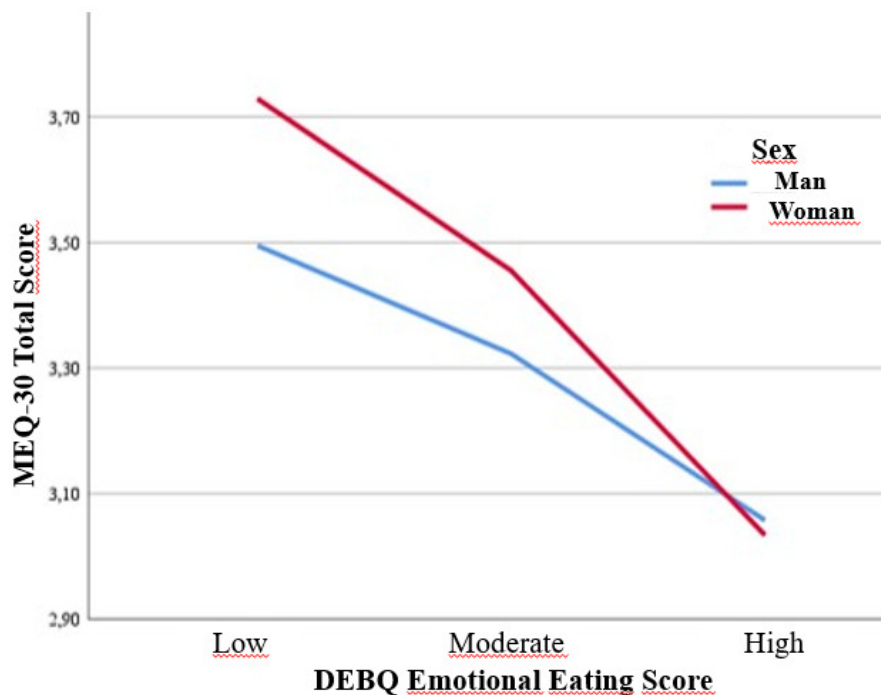
Figure 1. MEQ-30 Total Score with Gender Interaction Effect Graph For IES-2 Total Score

Table 6. Moderation Analysis for the Estimation of Intuitive Eating and Mindful Eating

With Mindful Eating and Gender for the Estimation of Intuitive Eating						
Bootstrap						
	Coefficient	%95 CI Lower Bond	%95 CI Upper Bond	Std. Error	t	p
Constant	3.366	1.669	5.129	0.879	3.882	<0.001
MEQ-30 Total Score	0.051	-0.494	0.559	0.266	0.198	0.843
Gender	-1.241	-2.145	-0.351	0.458	-2.689	0.007
Interaction	0.343	0.080	0.623	0.138	2.508	<b>0.013</b>
<i>R=0.526 R-sq=0.277 F=66.07 sd1=3 sd2=518 p&lt;0.001</i>						
With Emotional Eating and Gender for the Estimation of Mindful Eating						
Bootstrap						
	Coefficient	%95 CI Lower Bond	%95 CI Upper Bond	Std. Error	t	p
Constant	3.332	3.002	3.655	0.168	20.864	<0.001
DEBQ Emotional Eating	-0.071	-0.236	0.102	0.086	-0.929	0.353
Gender	0.336	0.160	0.520	0.092	3.820	<0.001
Interaction	-0.102	-0.195	-0.013	0.046	-2.506	<b>0.013</b>
<i>R=0.616 R-sq=0.379 F=105.568 sd1=3 sd2=518 p&lt;0.001</i>						

eating and the differences in scale scores in terms of sociodemographic characteristics in participants aged 18-65. When intuitive eating is evaluated according to gender it is reported that men are more dependent on internal signals than women (T. S. Smith and Hawks 2006; J. M. Smith et al. 2020). However, in our study, no significant difference was found between the genders in terms of the IES-2 total score, and it was found that men and women were similar in terms of their intuitive eating orientation. When the genders are

compared in terms of mindful eating, it is reported that the genders have similar predispositions. Choi et al. (Choi and Lee 2020) reported that there was no significant difference between the genders in terms of the total score of MEQ in their study with a total of 205 participants (93.1% woman and 6.9% man). The findings of this study and our study show that the genders have a similar predisposition in terms of mindful eating.



**Figure 2. DEBQ Emotional Eating Score with Gender Interaction Effect Graph for MEQ-30 Total Score**

The tendency of the genders to restraint eating and emotional eating is also an important issue. Studies reported that women showed higher dietary restraint than men (Goldfield and Lumb 2008; Lesdéma et al. 2012). We found that DEBQ Restraint Eating subscale score was significantly higher in women than in men. As it has been shown in the literature that women tend to have more restraint eating behavior compared to men, an expected situation was observed in our study as well. In addition, studies reported that women eat more in response to their mood than men (Larsen et al. 2006; J. M. Smith et al. 2020). It is thought that women's tendency to emotional eating is higher than men, showing more depressive symptoms and being more expressive emotionally (Oh and Kim 2023). The findings of our study are in line with the literature.

Mindful eating and intuitive eating approaches are associated with lower BMI and it is emphasized that they are effective in reducing body weight in obese people in several studies (Van Dyke and Drinkwater 2013; Rogers et al. 2016). A meta-analysis of 10 studies on the effects of intuitive eating and mindful eating on weight loss have also reported that intuitive eating and mindful eating strategies significantly affected weight loss compared to controls that did not receive this intervention (Fuentes Artilles et al. 2019).

Contrary to mindful eating and intuitive eating, adopting emotional eating and restraint eating behaviors are associated with increased BMI and adiposity. Regarding this issue, Lazarevich et al., in their study, reported that as emotional eating increases, BMI also increases (Lazarevich et al. 2016). In another study, it was reported that adiposity increases as the restraint scores increase (Goldfield et al. 2010). We found that the IES-2 total score and the MEQ-30 total score were significantly higher in participants with BMI < 25. There was no significant difference between the

groups in terms of the DEBQ Restraint Eating subscale, while the DEBQ Emotional Eating subscale score was significantly higher in obese or overweight (BMI  $\geq 25$ ). In addition, we found that there was a weak negative correlation between IES-2 and MEQ-30 total score, MEQ-30 Disinhibition and Eating Control subscales and BMI, and a very weak positive correlation between DEBQ Restraint Eating and Emotional Eating subscale scores and BMI. Studies in the literature and the results of our study suggest that intuitive eating and mindful eating approaches based on internal cues rather than external cues and the individual's current experience with food, may be an alternative in the prevention and treatment of obesity (Van Dyke and Drinkwater 2013; Rogers et al. 2016), and maladaptive behaviors such as restraint eating and emotional eating may be risk factors (Lazarevich et al. 2016; Goldfield et al. 2010). Our findings suggest that more studies are needed to explain the role of these maladaptive behaviors in the pathophysiology of obesity, given that the relationship between BMI and emotional eating and restraint eating behavior is very weak.

It is also important to evaluate the relationship between intuitive eating, mindful eating, restraint eating, and emotional eating. Regarding this issue, in the study conducted by Kerin et al. (Kerin, Webb, and Zimmer-Gembeck 2019), weak to moderate positive correlations were reported between the subscales of IES-2 and MEQ-30, with a correlation coefficient between 0.07 and 0.59. In our study, the positive relationship we found between the total score of IES-2 and the total score of MEQ-30 supports the literature. The literature and the significant relationships in our study showed that as the level of intuitive eating increased, mindful eating also increased and proved that intuitive eating and mindful eating approaches conceptually overlap with each other.

Mindful eating and intuitive eating approaches do not adopt the idea of using foods to cope with situations such as sadness and anxiety, instead they are based on the idea of getting to the root of the problem and being aware of individual's internal signals (Tribole and Resch 2012; Dalen et al. 2010). Studies on this subject report negative relationships between the IES-2 Eating For Physical Rather Than Emotional Reasons subscale and Emotional Eating (Kerin, Webb, and Zimmer-Gembeck 2019; Barrada et al. 2020). It is also reported that emotional eating is inversely related to mindful eating (Kerin, Webb, and Zimmer-Gembeck 2019). Smith et al. reported inverse relationships between all subscales of IES-2 and emotional eating. In addition, they reported that the inverse relationship between emotional eating and the IES-2 total score was strong in women ( $r=-0.78$ ), while it was moderate in men ( $r= - 0.54$ ) (J. M. Smith et al. 2020). In our study, the inverse relationships between intuitive eating and emotional eating and between mindful eating and emotional eating support the literature. In addition, in our study, there was a weak negative correlation ( $r=-.284$ ) between DEBQ Emotional Eating subscale and IES-2 total score in man participants, and a strong negative correlation ( $r=-.611$ ) in women. This finding supported the finding reported by Smith et al. (J. M. Smith et al. 2020). Similarly, there was a moderate negative correlation ( $r=-0.405$ ,  $p<0.01$ ) in men, and a strong negative correlation ( $r=-0.647$ ,  $p<0.01$ ) in women, between MEQ-30 total score and DEBQ Emotional Eating subscale. In general, the studies in the literature (Kerin, Webb, and Zimmer-Gembeck 2019; Barrada et al. 2020) and the findings of our study showed that as the level of intuitive eating and mindful eating increased, people's emotional eating levels decreased, and provided a basis that these adaptive eating behavior approaches could be effective in reducing maladaptive eating behaviors such as emotional eating.

Strict dietary control is associated with adverse health outcomes, while intuitive eating is associated with positive results on various parameters such as BMI and body image (Tylka, Calogero, and Daniélsdóttir 2015). There are also studies in the literature evaluating the relationship between these two components, which have different effects on health parameters. In this direction, studies report an inverse relationship between intuitive eating and strict dietary control (Tylka, Calogero, and Daniélsdóttir 2015; Linardon and Mitchell 2017). In addition to these studies, Smith et al., who examined the relationship between restraint eating behavior and intuitive eating on the basis of gender, reported that this inverse relationship was moderate in women, but weak in men. Our study also supported the literature. These findings showed that as individuals' intuitive eating level increased, their orientation towards restricted eating behaviors decreased, and although the relationship was weak, intuitive eating represented the other end of the spectrum, reflecting the opposite of restriction.

While it has been reported that the mindful eating approach can be an alternative for the prevention and treatment of eating disorders (Hepworth 2010), it is reported that restricted eating behaviors may be a risk factor (Andrés and Saldaña 2014). In the literature, the role of mindful

eating in reducing restraint eating behaviors, which is reported to be a risk factor in the pathophysiology of eating disorders, has been evaluated. In a systematic review of 15 studies that used mindfulness approaches to change eating behaviors and treat eating disorders in adolescents, it was reported that mindfulness approach was positively associated with reduced dietary restriction (Omiwole et al. 2019). In the study conducted by Anderson et al. (Anderson et al. 2015), it was reported that there was no significant relationship between the total score of MEQ and the Cognitive Restraint of Eating subscale of the Three-Factor Eating Questionnaire. Similarly, in our study, no significant relationship was found between the MEQ-30 total score and the DEBQ Restraint Eating subscale when evaluated both in all participants and on the basis of gender, and the findings of our study could not provide a basis for the effectiveness of the mindful eating approach in reducing restraint eating behaviors.

When the moderation analysis was performed in our study, it was found that gender did not have a moderator role in the relationship between the IES-2 total score and the DEBQ Emotional Eating score, and the IES-2 total score and the DEBQ Restraint Eating score. In relation to this, in the study examining the psychometric properties of IES-2 in Hispanic American university students, no gender differences were found for the other subscales, except for the Eating For Physical Rather Than Emotional Reasons subscale (Saunders, Nichols-Lopez, and Frazier 2018). Smith et al. (J. M. Smith et al. 2020), determined that gender had a moderator role in the relationship between intuitive eating and emotional eating, and between intuitive eating and restraint eating behavior. In addition, in this study, both emotional eating and gender and restraint eating behavior and gender interaction were determined for the IES-2 Eating For Physical Rather Than Emotional Reasons Subscale. As a result, in this study, it was reported that restraint eating and emotional eating may be an obstacle for intuitive eating strategy, especially in women. Despite having a similar participant profile in terms of gender, contrary to this study, the reason why we did not find any significant results in our study is thought to be because Smith et al. conducted a moderation analysis in a model in which BMI was controlled, while we were working in a model in which BMI was not controlled.

To our knowledge, this is the first study to investigate the moderator role of gender in the relations between the total score of IES-2 and the total score of MEQ-30, and the total score of MEQ-30 and DEBQ Emotional Eating score. In addition, our study revealed that gender explained 27.7% of the relationship between the total score of IES-2 and the total score of MEQ-30, and 37.9% of the relationship between the total score of MEQ-30 and the DEBQ Emotional Eating score. This study also sheds light on how emotional eating will pose in the face of the mindful eating strategy. A sharper decrease in mindful eating in women as emotional eating levels increase suggests that emotional eating may be an obstacle to this strategy.

## LIMITATIONS

Limitation of our study is that all the data obtained due to the online conduct of the research are based on the participants' own statements. Previous studies by J. M. Smith et al. (2020) and Saunders, Nichols-Lopez, and Frazier (2018) have also been conducted online. Considering the ease of application, online studies are preferred in the literature. However, the findings should be evaluated with this situation in mind. Another limitation of the study is that the number of woman participants is higher than that of man. Considering the effects of gender, studies with larger samples are needed in which both genders have similar numbers.

## CONCLUSION

There are few studies in the literature examining the role of gender in the relationships between intuitive eating, mindful eating, dietary restraint, and emotional eating. Accordingly, this study will be an important basis for making gender-specific comments.

In conclusion, our findings confirmed that intuitive eating and mindful eating approaches can be effective in preventing obesity. In addition, women were more prone to restraint eating and emotional eating. Considering the roles of emotional eating and restraint eating behaviors in the pathophysiology of eating disorders, this finding suggests that women may be at higher risk. In addition, we supported that intuitive eating and mindful eating strategies can be effective practices in reducing emotional eating. For this reason, it is thought that the dissemination of intuitive eating and mindful eating practices can be effective strategies for both improving eating behaviors and preventing eating disorders and obesity. However, it is a fact that should not be ignored that emotional eating behaviors can be an obstacle when applying these strategies, especially in women. However, the relationship between restraint eating and these strategies is weak. Considering the findings reported by studies regarding the effectiveness of mindfulness and intuitive eating in reducing restraint eating behaviors, it is thought that more studies are needed to explain the role of these strategies in this regard. In addition, this is the first study to investigate the moderator role of gender in the relations between the total score of IES-2 and

the total score of MEQ-30, and the total score of MEQ-30 and DEBQ Emotional Eating score.

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## ETHICAL ASPECT OF THE RESEARCH

The Ethics Committee on Medical Research of Acibadem Mehmet Ali Aydinlar University approved the study (ATADEK 2021/05) and informed consent was obtained from participants before starting the research.

## AUTHORSHIP CONTRIBUTION

Conceptualization: Meryem Kahrıman, Nese KAYA. Methodology: Meryem Kahrıman, Nese KAYA. Investigation: Meryem Kahrıman. Writing – original draft: Meryem Kahrıman. Project administration: Meryem Kahrıman. Writing – review & editing: Nese KAYA. Supervision: Nese KAYA.

## DATA AVAILABILITY

Data will be made available upon direct request to the corresponding author of this paper.

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## CONFLICT OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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## SUPPLEMENTARY MATERIALS

### **Table 4. Correlation Between BMI and Scale Scores**

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