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RELATIONSHIPS BETWEEN ORTHOREXIA NERVOSA TENDENCY, MINDFUL EATING, AND BODY MASS INDEX IN YOUNG ADULTS (19-32 AGED): A CROSS-SECTIONAL STUDY BASED ON GENDER DIFFERENCES

GENÇ YETİŞKİNLERDE (19-32 YAŞ) ORTOREKSİYA NERVOZA EĞİLİMİ, YEME FARKINDALIĞI VE BEDEN KÜTLE İNDEKSİ ARASINDAKİ İLİŞKİLER: CİNSİYET FARKLILIKLARINA DAYALI KESİTSEL BİR ÇALIŞMA

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ABSTRACT

Objective: This cross-sectional study investigated the associations between Orthorexia Nervosa (ON), mindful eating, and body mass index (BMI) among young adults, and explored gender-based differences in ON tendencies and mindful eating.

Method: The research was conducted between October and December 2024 in Elazığ, Türkiye, and included 757 healthy participants. Data were collected using face-to-face questionnaires assessing sociodemographic characteristics, the Orthorexia Nervosa-11 Scale (ORTO-11), and the Mindful Eating Questionnaire (MEQ). Anthropometric measurements were obtained to calculate BMI, and a p-value of <0.05 was considered statistically significant.

Results: The findings revealed that 54.9% of participants exhibited a tendency toward ON. The prevalence of ON tendency was significantly higher in females (57.3%) than in males (46.9%) (p=0.019). While no significant gender differences were observed in overall MEQ scores, some sub-factors (thoughtless eating, emotional eating, eating control, conscious eating) showed statistically significant variation (p<0.05). Similarly, no differences in total ON scores were found across BMI categories. However, significant differences were identified in MEQ total scores and certain sub-factors (thoughtless eating, eating control, eating discipline and conscious eating) between BMI categories (p<0.05). No statistically significant association was found between total MEQ score and ON tendency. Nevertheless, ON tendency was negatively associated with the thoughtless eating and positively associated with the eating control, eating discipline, and conscious eating sub-factors of the MEQ. These findings suggest that while overall mindful eating may not directly predict ON tendency, particular aspects of mindful eating play a meaningful role.

Conclusion: This study demonstrates that ON tendency may be observed at higher levels in young adult females compared to males. Although BMI was not found to be associated with ON risk, significant associations were identified with several subdimensions of mindful eating. These findings underscore the importance of gender-sensitive and subdimension-focused interventions in the assessment and prevention of orthorexic tendencies.

Key Words: Orthorexia Nervosa, Mindful Eating, BMI

ÖZ

Amaç: Bu kesitsel çalışmada, genç yetişkinlerde Ortoreksiya Nervosa (ON), yeme farkındalığı ve beden kütle indeksi (BKİ) arasındaki ilişkiler incelendi ve ON eğilimleri ile yeme farkındalığının cinsiyete dayalı farklılıkları değerlendirildi.

Yöntem: Araştırma Ekim-Aralık 2024 tarihleri arasında Türkiye'nin Elazığ ilinde yürütüldü ve 757 sağlıklı katılımcıyı kapsadı. Veriler yüz yüze uygulanan anketler aracılığıyla toplandı; sosyodemografik özellikler, Ortoreksiya Nervosa-11 Ölçeği (ORTO-11) ve Yeme Farkındalığı Ölçeği (YFÖ) değerlendirildi. Antropometrik ölçümler alınarak BKİ hesaplandı ve istatistiksel anlamlılık düzeyi p<0.05 olarak kabul edildi.

Bulgular: Çalışma, katılımcıların %54.9'unun ON eğilimi gösterdiğini ortaya koydu. ON eğiliminin prevalansı kadınlarda (%57.3), erkeklere (%46.9) kıyasla istatistiksel olarak anlamlı düzeyde daha yüksek bulundu (p=0.019). Genel MEQ puanlarında cinsiyete bağlı anlamlı bir fark saptanmamış olsa da bazı alt boyutlarda (düşünmeden yeme, duygusal yeme, yeme kontrolü, farkındalık) istatistiksel olarak anlamlı farklılıklar tespit edildi (p<0.05). Benzer şekilde, BKİ kategorileri arasında toplam ON puanları açısından bir farklılık bulunmadı. Bununla birlikte, BKİ kategorileri arasında MEQ toplam puanlarında ve belirli alt boyutlarında (düşünmeden yeme, yeme kontrolü, yeme disiplini ve farkındalık) anlamlı farklılıklar belirlendi (p<0.05). Toplam MEQ puanı ile ON eğilimi arasında istatistiksel olarak anlamlı bir ilişki saptanmadı. Bununla birlikte, ON eğilimi MEQ'in düşünmeden yeme alt boyutu ile negatif; yeme kontrolü, yeme disiplini ve farkındalık alt boyutları ile ise pozitif yönde ilişkili bulundu. Bu bulgular, genel yeme farkındalığı düzeyinin ON'u doğrudan öngörmeyebileceğini, ancak yeme farkındalığının belirli boyutlarının anlamlı bir rol oynadığını gösterdi.

Sonuç: Bu çalışma, genç yetişkin kadınlarda ON eğiliminin erkeklere kıyasla daha yüksek düzeyde görülebildiğini ortaya koymaktadır. BKİ'nin ON riski ile ilişkili olmadığı görülse de yeme farkındalığının çeşitli alt boyutları ile anlamlı düzeyde ilişkili bulundu. Bu bulgular, ortoreksiya eğilimlerinin değerlendirilmesi ve önlenmesinde cinsiyete duyarlı ve alt boyut odaklı müdahalelerin önemini vurgulamaktadır.

Anahtar Kelimeler: Ortoreksiya Nervosa, Yeme Farkındalığı, BKİ

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INTRODUCTION

Disordered eating behaviors have emerged as a critical public health concern, attracting increasing attention from researchers, healthcare professionals, and policymakers. Of particular concern is the rising prevalence of eating disorders such as anorexia nervosa, bulimia nervosa, and binge-eating disorder, which pose significant health risks and may become life-threatening if left untreated [1]. In recent decades, an alarming upward trend in the prevalence of eating disorders has been observed among adolescents and young adults [2].

In recent years, "clean eating," a novel dietary trend widely promoted through social media, has gained increasing popularity. Emphasizing the consumption of healthy and "pure" foods, clean eating may reflect a pathological preoccupation with healthy eating. This obsession with the purity (quality) of food constitutes the core feature of Orthorexia Nervosa (ON). ON is characterized by obsessive behaviors and a persistent preoccupation with healthy eating, involving rigid adherence to a restrictive "healthy" diet perceived as pure and the strict avoidance of foods considered unhealthy [3]. The growing obsession with the "purity" and "healthiness" of food can ultimately lead to the elimination of numerous food types from the diet, resulting in nutritional deficiencies, malnutrition, and in severe cases, even death [4]. Given that orthorexic behaviors are typically characterized by rigid control, anxiety, and inflexibility around eating, recent research indicates that higher levels of dispositional mindfulness are inversely related to pathological orthorexia, suggesting that mindfulness may foster a more balanced and adaptive relationship with food [5].

Mindfulness is defined as the capacity to bring attention to present-moment experiences -both internal (i.e., thoughts, emotions, and bodily sensations) and external (i.e., the immediate environment)- with an open and nonjudgmental attitude [6]. In particular, increasing levels of mindfulness have been reported to exert positive effects on health outcomes [7]. Mindful eating is defined as "focusing not on what is being eaten, but rather on how and why the eating behavior occurs; internalizing the concepts of physical hunger and satiety; being aware of the influence of emotions and thoughts; making food choices without being influenced by environmental factors or judgment; and consuming food by focusing on the present moment" [8]. Before automatically beginning to eat, it is recommended that individuals take a moment -approximately one minute- to pause and reflect on what they are feeling and which emotions they may be trying to satisfy through eating. If the desire to eat is not related to physical hunger, engaging in a more appropriate alternative activity is considered beneficial [9]. Strategies commonly used in mindful eating interventions include thoroughly chewing each bite, slowing down the pace of eating, placing the fork down between bites, taking time to savor the smell, taste, and texture of the food, eating meals at a table without reading or using electronic devices, expressing gratitude for access to food, and naming flavors to enhance focus [10].

Mindfulness-based approaches are increasingly gaining popularity as interventions for eating disorders. Enhancing mindful eating has been shown to support recovery through mechanisms such as reducing recurring negative thoughts associated with eating disorders, increasing self-compassion, shifting attention away from food-related preoccupations, improving psychological flexibility, enhancing emotional regulation, and fostering better recognition of hunger and satiety cues [11]. Moreover, mindful eating training has been suggested to help individuals diagnosed with eating disorders develop effective coping strategies [12].

Recent studies indicate that the tendency toward ON has been increasing particularly among young adults, and that obsessive behaviors related to healthy eating may negatively impact their quality of life [13,14].

ON has been examined in terms of its relationship with different genders and body mass index (BMI) and the results have been found to be inconsistent [15,16], therefore this study also examined these

relationships in order to broaden the contribution of our research. The literature suggests a possible relationship between mindful eating and ON, which forms the theoretical basis of this study. Therefore, the present study aims to examine the potential relationships between ON, mindful eating, and BMI among young adults, and to explore gender-based differences in ON tendencies and mindful eating behaviour.

METHOD

Study Design and Participants

The target population of the study consisted of young adults aged 19-32 years residing in Elazığ province, Türkiye, during the study period. This study was conducted between October and December 2024 and was designed as a cross-sectional study. Participants were recruited through voluntary announcements distributed at the university and in various community settings within the same locality.

Individuals were informed about the study procedures, duration, and confidentiality prior to participation, and appointments were scheduled based on availability. Data were collected via face-to-face interviews. After recording demographic information, participants were screened per the exclusion criteria. Anthropometric measurements were subsequently performed for eligible individuals, followed by the completion of the relevant assessment scales.

The study group consisted of 789 volunteers aged 19-32 years who signed the informed consent form, were accepted as young adults in the literature [17], and were selected using a convenience sampling method. Due to incomplete data and reported psychiatric history, 32 participants were excluded. As a result, the study was completed with 757 participants. Participants with psychiatric or neurological disorders (e.g., psychotic disorders, bipolar disorder, post-traumatic stress disorder, or diagnosed eating disorders) or chronic illnesses were excluded from the study. The required sample size was calculated based on an *a priori* power analysis for an independent samples t-test. Following Cohen's (1988) guidelines for detecting a small effect size ($d=0.25$), with a significance level (α) of 0.05 and a statistical power ($1-\beta$) of 0.80, the analysis indicated that a minimum of 504 participants were required [18].

Outcome Measures

A survey form was used to collect data, which queried socio-demographic characteristics (e.g., gender, age, educational status), anthropometric measurements, nutritional information, the Orthorexia Nervosa scale, and the Mindful Eating Questionnaire. Participants were asked to report their gender, age, educational status, presence of any illnesses, and physical activity levels.

Antropometric Measurements: Participant's height and weight were measured, and BMI was calculated by dividing weight in kilograms by the square of height in meters (kg/m^2). The body weight of the participants was measured with the TANITA BC545N device in the morning while fasting, after defecation, with light/ thin clothes, without shoes and in accordance with the measurement technique. Height was measured using a portable stadiometer with the feet together and the head in the Frankfort plane. BMI categories were classified according to the World Health Organization (WHO) criteria: $<18.50 \text{ kg}/\text{m}^2$ was considered underweight (UW), $18.50\text{-}24.99 \text{ kg}/\text{m}^2$ normal weight (NW), $25.00\text{-}29.99 \text{ kg}/\text{m}^2$ overweight (OW), $30.00\text{-}34.99 \text{ kg}/\text{m}^2$ obese (OB) class I, and $\geq 35.00 \text{ kg}/\text{m}^2$ as obese class II and morbid obesity [19].

Orthorexia Nervosa-11 Scale (ORTO-11): The ORTO-11 scale was originally developed by Donini et al. [20] to identify the obsession with healthy eating behaviors in individuals. This 11-item assessment tool aims to measure the tendency toward ON and is structured as a 4-point Likert scale. The validity and reliability study of the scale for the Turkish population was conducted by Arusoğlu et al. [21]. In this scale, the responses "always," "often," "sometimes," and "never" are scored as 1, 2, 3, and 4 points, respectively; however, item 8 is reverse scored.

According to the ORTO-11, the cut-off score is ≤ 27 . Based on this threshold, individuals scoring ≤ 27 are classified as having an orthorexia tendency, whereas those scoring > 27 are considered not to exhibit such a tendency [19]. In the present study, the McDonald's omega (ω) coefficient for the ORTO-11 was .719, indicating acceptable composite reliability.

Mindful Eating Questionnaire (MEQ): The Mindful Eating Questionnaire (MEQ) developed by Framson et al. [22] is used to measure mindful eating. The Turkish adaptation, including validity and reliability studies, was conducted by Köse et al. [8], and the scale is referred to as MEQ. The scale consists of 30 items and seven sub-factors: thoughtless eating, emotional eating, eating control, conscious eating, eating discipline, awareness, and interference. MEQ's sub-factors include thoughtless eating (quantity, self-restraint, and time control) with 5 items, emotional eating (eating for feeling good, emotional hunger, and gratification) with 5 items, eating control (maintaining control over the eating function, regulating eating speed) with 4 items, mindfulness (awareness of physical hunger and satiety, knowledge of healthy eating, knowledge of calories and nutritional value, and awareness of habits) with 5 items, eating discipline (planning, balancing, preparation, organization, timing, having food) with 4 items, and focus-mindful eating (pausing other activities and thoughts while eating, focusing on the food itself and its taste) with 5 items, and being affected by non-interference factors (ability to cope with distractions such as food diversity or advertising, invitation to sensory factors such as sight, smell, sound) consist of 2 items. Twenty items on the scale are reverse scored. A five-point Likert-type scale is used for scoring (1: Never, 2: Rarely, 3: Sometimes, 4: Often, 5: Always). Scores are calculated based on the sub-factors, and the total scale score is obtained by averaging the sub-factor scores. Higher scores indicate greater mindful eating. In the present study, the McDonald's omega (ω) coefficient for the overall MEQ was .772, indicating acceptable composite reliability.

Ethical Approval

Written informed consent was obtained from all individuals participating in the study. The study was conducted according to the criteria set by the Declaration of Helsinki, and the study protocol was approved by Non-Interventional Research Ethics Committee of Firat University (date: 10.10.2024, decision number: 2024/13-34).

Statistical Analysis

All statistical procedures were executed using R software (version 4.4.3) and complemented by MedCalc (version 23). Initially, participant demographics and primary study variables were summarized using descriptive statistics. Continuous variables that approximated a normal distribution were presented as mean $\pm$ standard deviation ($M \pm SD$), while variables with skewed distributions were described using the median and interquartile range (IQR); categorical data were reported as absolute frequencies (n) and relative percentages (%). To ensure the appropriate application of statistical models, a comprehensive assessment of underlying assumptions was performed. Normality was evaluated through a combination of statistical tests (Shapiro-Wilk and Kolmogorov-Smirnov), visual inspection of histograms and Q-Q plots, and an examination of skewness and kurtosis values, while the homogeneity of variances across groups was tested using Levene's test. The alpha level for determining statistical significance was established a priori at 0.05 for all two-tailed tests. The choice of inferential test was contingent upon data characteristics and the number of groups being compared: for two-group comparisons, the independent samples t-test was utilized, with Welch's t-test applied when the assumption of equal variances was violated and the non-parametric Mann-Whitney U test used for non-normal data. The chi-square (χ^2) test of independence was employed to assess the association between categorical variables, with Phi (ϕ) coefficient reported as the effect size measure for 2×2 contingency tables. For assessing differences across more than two groups, a one-way Analysis of Variance (ANOVA) was performed, followed by

Tukey's Honestly Significant Difference (HSD) post-hoc test if a significant main effect was found. Finally, to quantify the practical significance and strength of the observed effects, effect sizes were calculated, using Cohen's d for t-tests and the rank biserial correlation coefficient for the Mann-Whitney U test. Given the large sample size ($N=757$) and the robustness of parametric tests to normality violations in sufficiently large samples, as supported by the Central Limit Theorem [23], ANOVA was retained for multi-group comparisons even in cases where minor departures from normality were observed.

RESULTS

Table 1 presents the demographic characteristics of 757 young adult participants. Of the participants, 23.6% were male and 76.4% were female. The mean age was 22.91 ± 3.08 years for females and 23.84 ± 3.48 years for males. The majority of participants reported their education level as undergraduate. Among male participants, 57% had a normal BMI, while 33% were classified as OW; among female participants, 67% had a normal BMI and 16% were classified as OW. Regarding meal habits, 38% of all participants reported skipping breakfast, 52% skipped lunch, and only 0.01% reported never skipping any meals. Additionally, 61% of participants consumed snacks between meals, whereas 39% did not consume snacks.

As shown in Table 2, a significant difference was found between genders in orthorexia scores ($p < 0.05$). Furthermore, the chi-square test revealed a statistically significant association between gender and ON risk classification ($p = 0.019$); 57.3% of females exhibited ON tendency compared to 46.9% of males. Although no significant difference was observed between genders in the total MEQ score, significant differences were identified in several sub-factors of the questionnaire, including thoughtless eating, emotional eating, eating control, and conscious eating ($p < 0.05$).

As shown in Table 3, no significant relationship was found between ON scores and BMI categories. Significant differences in total MEQ scores were observed between UW and OW individuals, as well as between NW and OW individuals. Regarding the sub-factors of the MEQ, significant differences were identified in the thoughtless eating sub-factor between UW and OW, and NW and OW categories; in the eating control sub-factor between UW and NW, UW and OW, UW and class I OB, and OW and class I OB individuals; in the eating discipline sub-factor between UW and NW, UW and OW, UW and class I OB, and UW and class II-III OB categories; and in the conscious eating sub-factor between NW and OW individuals ($p < 0.05$).

According to Table 4, it was determined that $n=415$ participants scored below the threshold value (ON score ≤ 27), whereas $n=312$ participants scored above the threshold. No significant relationship was found between ON risk and the total MEQ score ($p = 0.289$); however, significant associations were observed between ON risk and several MEQ sub-factors, including thoughtless eating, eating control, eating discipline, and conscious eating ($p < 0.05$).

DISCUSSION

This cross-sectional study aimed to examine the relationships between ON tendency, mindful eating, and BMI among young adults and to evaluate whether these variables differ by gender.

The findings indicate that more than half of the participants may be at risk for ON tendency and that this tendency was observed at statistically higher levels in females compared to males. Although no significant difference was identified between BMI categories and total ON scores, significant differences were found in total mindful eating scores and several sub-factors of mindful eating across BMI categories. Furthermore, while the overall level of eating awareness was not significantly associated with ON tendency, specific sub-factors were found to demonstrate both negative and positive associations with ON.

Table 1. Demographic characteristics of the participants

Variables		Gender					
		Male (n:179)		Female (n:578)		Total	
		M±SD	Min-Max	M±SD	Min-Max	M±SD	Min-Max
Age (year)		23.84±3.48	19-32	22.91±3.08	19-32	23.13±3.2	19-32
BMI (kg/m ²)		24.94±3.92	16.41-44.79	22.61±3.78	10.36-41.79	23.16±3.94	10.36-44.79
Variables		N	%	n	%	n	%
Education	Literate	1	20.00	4	80.00	5	0.6
	Primary School	2	33.33	4	66.67	6	0.7
	Middle School	1	8.33	11	91.67	12	1.5
	High School	26	28.89	64	71.11	90	12
	Associate Degree	14	18.18	63	81.82	77	10
	Bachelor's Degree	122	22.68	416	77.32	538	71
	Graduate Degree	13	44.83	16	55.17	29	3.8
BMI Categories	UW	3	4.41	65	95.59	68	9
	NW	103	20.89	390	79.11	493	65
	OW	60	39.22	93	60.78	153	20
	OB I	8	23.53	26	76.47	34	4.4
	OB II- III	5	55.56	4	44.44	9	1.2
Meal Skipping	None	9	60.00	6	40.00	15	2
	Morning	81	27.93	209	72.07	290	38
	Mid-day	76	19.05	323	80.95	399	53
Snacking Habits	Night	13	24.53	40	75.47	53	9
	Yes	96	20.73	367	79.27	463	61
Habits	No	83	28.23	211	71.77	294	39

M:Mean, SD:Standard deviation, BMI:Body Mass Index, UW:Underweight, NW:Normal; OW:Overweight, OB:Obese

Table 2. Gender-based comparison results of orthorexia nervosa and mindful eating scores

Variable	Male (n:179)		Female (n:578)		p
	M±SD	Min-Max	M±SD	Min-Max	
Total ORTO-11 Score	27.80±3.44	19.00-35.00	26.91±3.41	19.00-35.00	0.003^a
Total MEQ Score	95.53±10.49	70.00-119.00	96.39±11.52	69.00-121.00	0.376 ^a
Sub Factors of MEQ Scale					
Thoughtless eating	15.87±3.48	8.00-24.00	16.46±3.47	7.00-25.00	0.046^a
Emotional eating	17.84±4.18	5.00-25.00	15.83±4.56	5.00-25.00	<0.001^a
Eating control	13.16±3.26	4.00-20.00	14.88±3.36	4.00-20.00	<0.001^a
Awareness	15.70±2.02	9.00-22.00	15.69±1.95	8.00-23.00	0.936 ^a
Eating discipline	11.69±2.41	5.00-18.00	11.48±2.59	4.00-19.00	0.340 ^a
Conscious eating	14.53±2.30	5.00-19.00	15.33±2.41	7.00-22.00	<0.001^a
Interference	6.73±1.74	2.00-10.00	6.71±1.60	2.00-10.00	0.923 ^a
ON Tendency (n,%)	84 (46.9%)		331 (57.3%)		0.019^c

M:Mean, SD:Standard deviation, ORTO-11:Orthorexia Nervosa Questionnaire-11; MEQ-30:Mindful Eating Questionnaire, ON scoring ≤27 are classified as having a tendency and

ON scoring >27 are considered not to have such a tendency; ^a:Independent samples t-test, ^c:Chi-square (χ²) test of independence.

In the present study, the risk of orthorexic tendencies was found to be higher in females compared to males (Table 2). These findings are consistent with existing literature [24-26]. Conversely, some studies in the literature report that males exhibit significantly higher orthorexic tendency scores than females [27]. The alignment of our findings with those reported in the literature may be associated with the fact that these studies were conducted in contexts characterized by shared social norms and similar eating behaviors. Conversely, the emergence of differing results may be attributable to variations in developmental stages (e.g., adult versus adolescent samples), cognitive and behavioral differences related to educational level, and the diversity of the sociocultural environments in which the studies were conducted. No statistically significant difference was observed between genders in total MEQ scores in this study; however, significant differences were identified in certain sub-factors. Specifically, thoughtless eating, eating control, and conscious eating scores were higher in females, whereas emotional eating scores were higher in males. These results align with previous research [28-30]. These findings suggest that females demonstrate greater proficiency in eating speed regulation, control over eating behavior, and mindful eating, while males appear more successful in managing emotional hunger.

In the present study, no statistically significant relationship was found between BMI categories and total ON scores (Table 3); however, a significant association was observed between BMI categories and total MEQ scores. This finding suggests that the primary determinants of ON are not solely physical measures but are also closely related to psychological and cognitive processes associated with eating behavior. A review of the current literature reveals inconsistent findings regarding the relationships between BMI categories and total ON scores [3,31,15,16] as well as MEQ total scores [28,32-34]. The convergence of results across certain studies may be explained by

similarities in measurement instruments (e.g., ORTO-11 or ORTO-15), the inherent limitations of cross-sectional designs, and comparable sample characteristics (such as homogeneous samples consisting of university students or young adults).

In contrast, inconsistent findings may be attributable to sample heterogeneity, particularly with respect to age groups, and differences in measurement instruments (e.g., the Düsseldorf Orthorexia Scale).

Table 3. BMI categories-based comparison results of orthorexia nervosa and mindful eating scores

Variable	BMI Categories	n	M±SD	p	Categories Comparisons
Total ORTO-11 Score	UW	68	27.26±3.49	0.842 ^b	None
	NW	493	27.20±3.36		
	OW	153	26.87±3.61		
	OB I	34	26.85±3.97		
	OB II- III	9	27.33±2.55		
Total MEQ Score	UW	68	98.34±11.25	0.002 ^b	UW-OW, NW-OW
	NW	493	96.91±11.04		
	OW	153	93.60±11.34		
	OB I	34	94.88±11.88		
	OB II- III	9	89.11±13.77		
Sub Factors of MEQ Scale					
Thoughtless eating	UW	68	17.12±3.80	0.001 ^b	UW-OW, NW-OW
	NW	493	16.54±3.35		
	OW	153	15.37±3.50		
	OB I	34	16.21±3.53		
	OB II- III	9	15.11±4.48		
Emotional eating	UW	68	16.94±4.64	0.127 ^b	None
	NW	493	16.50±4.21		
	OW	153	15.69±5.32		
	OB I	34	15.88±4.98		
	OB II- III	9	13.33±4.82		
Eating control	UW	68	15.87±3.35	<0.001 ^b	UW-NW, UW-OW, UW-OB I, NW-OW
	NW	493	14.65±3.45		
	OW	153	13.56±3.12		
	OB I	34	13.79±2.56		
	OB II- III	9	12.44±4.67		
Awareness	UW	68	15.54±1.98	0.182 ^b	None
	NW	493	15.66±1.95		
	OW	153	15.66±1.92		
	OB I	34	16.15±2.02		
	OB II- III	9	17.56±2.70		
Eating discipline	UW	68	10.66±2.61	0.006 ^b	UW-NW, UW-OW, UW-OB I, UW-OB II-III, NW-OW
	NW	493	11.50±2.50		
	OW	153	12.05±2.41		
	OB I	34	11.47±3.15		
	OB II- III	9	11.44±2.92		
Conscious eating	UW	68	15.51±2.60	0.003 ^b	NW-OW
	NW	493	15.28±2.42		
	OW	153	14.75±2.14		
	OB I	34	14.53±2.67		
	OB II- III	9	13.22±1.86		
Interference	UW	68	6.69±1.49	0.334 ^b	None
	NW	493	6.78±1.63		
	OW	153	6.54±1.70		
	OB I	34	6.85±1.74		
	OB II- III	9	6.00±1.00		

M: Mean, SD: Standard deviation, ORTO-11: Orthorexia Nervosa Questionnaire-11, MEQ-30: Mindful Eating Questionnaire, BMI: Body Mass Index, UW: Underweight, NW: Normal, OW: Overweight, OB: Obese. ^b: One way analysis of variance test. All pairwise comparisons were carried out via Tukey post hoc test.

Another important finding of the study was the statistically significant differences between BMI categories and several sub-factors of MEQ thoughtless eating, eating control, eating discipline, and conscious eating. This result is consistent with previous research [35] and supports the association between mindful eating and individuals' BMI. Similarly, the literature reports significant correlations between levels of mindful eating and body weight. Lower scores on the MEQ, indicating reduced levels of mindful eating, have been associated with a significantly increased risk of obesity—participants scoring low may be approximately 2.76 times more likely to be obese—whereas higher MEQ scores correlate with healthier eating habits and improved

weight management outcomes [36]. Moreover, mindful eating has been shown to effectively reduce obesity risk by decreasing binge eating episodes and enhancing emotional regulation related to food intake [37].

Table 4. The comparative results of mindful eating scores among orthorexia nervosa categories

Variable	With ON tendency (n=415) M±SD	Without ON tendency (n=342) M±SD	p	Effect size
Total MEQ score	96.58±11.78	95.70±10.66	0.289 ^a	0.078
Sub Factors of MEQ scale				
Thoughtless eating	16.05±3.52	16.66±3.40	0.015 ^a	-0.177
Emotional eating	16.06±4.71	16.61±4.34	0.198 ^d	0.055
Eating control	14.70±3.41	14.20±3.40	0.037 ^d	0.088
Awareness	15.69±1.95	15.69±1.99	0.714 ^d	0.015
Eating discipline	11.92±2.52	11.07±2.51	<0.001 ^d	0.336
Conscious eating	15.36±2.52	14.87±2.24	0.005 ^c	0.203
Interference	6.81±1.60	6.60±1.66	0.063 ^d	0.077

M: Mean, SD: Standard deviation, ON: Orthorexia nervosa, MEQ-30: Mindful Eating Questionnaire, ON scoring ≤27 are classified as having a tendency and ON scoring >27 are considered not to have such a tendency. ^a: Independent samples t-test, ^c: Independent samples t-test (with Welch correction), ^d: Mann-Whitney U test.

In this study (Table 4), no statistically significant difference was found between the total MEQ score and orthorexic tendencies. While some studies have reported a negative relationship between MEQ scores and ON, others have found no significant association [33,34,38]. Moreover, the absence of a significant correlation between total MEQ scores and ON may suggest that the concept of mindful eating does not fully capture the nature of ON [34].

However, significant differences were observed in certain MEQ sub-factors, particularly in thoughtless eating (negative correlation), eating control, eating discipline, and conscious eating. The moderate effect size observed for the eating discipline sub-factor ($d = 0.336$) suggests a practically meaningful association with orthorexic tendency beyond mere statistical significance. The negative correlation in the thoughtless eating sub-factor indicates that individuals with higher orthorexic tendencies tend to exhibit more deliberate, planned, and controlled eating behaviors. This aligns with literature suggesting that ON is characterized more by rigid regulation and control rather than randomness or carelessness in eating behavior [39].

The consistency of similar findings may be associated with the stable application of the MEQ sub-factor structure across different studies, the selection of samples from populations with comparable lifestyles and nutritional environments, and similarities in data collection procedures. In contrast, divergent results may be explained by the culturally variable nature of mindful eating behavior, psychometric differences among adapted versions of the scales, and variability in behavioral characteristics within samples (e.g., eating attitudes).

On the other hand, differences observed in the eating discipline and conscious eating sub-factors suggest some overlap between certain aspects of ON and mindful eating. Nevertheless, this overlap does not necessarily indicate healthy eating awareness. In orthorexic individuals, this form of awareness is often marked by inflexibility and rigid control. Consequently, these individuals may use mindful eating not as a means of internal balance or intuitive eating but rather as a tool to achieve “ideal” eating norms.

These findings suggest that orthorexic tendencies may be inversely related to certain sub-factors of mindful eating, yet may not fully reflect overall mindful eating behavior.

Limitations

Several limitations should be considered when interpreting the findings of this study. First, the cross-sectional design precludes causal inferences and limits the interpretation of observed associations to correlational relationships. Second, participants were recruited using a

convenience sampling method, which may restrict the generalizability of the findings beyond the studied population.

Third, although the sample size was adequate for statistical analyses, the gender distribution was imbalanced, with a higher proportion of female participants, which may influence the interpretation of gender-based comparisons. Fourth, the reliance on self-report measures (ORTO-11 and MEQ) may introduce response bias, including social desirability and recall bias.

Additionally, the ORTO-11 scale has been subject to methodological criticisms in recent literature, particularly regarding its psychometric properties and diagnostic accuracy. Therefore, findings related to orthorexic tendency should be interpreted with caution. Future studies employing longitudinal designs, more diverse and representative samples, and alternative validated assessment tools are recommended to further clarify these relationships.

CONCLUSION

This study indicates that orthorexic tendency is observed at considerable levels among young adults, with females exhibiting a higher prevalence than males. While BMI was not significantly associated with total ON scores, mindful eating levels differed across BMI categories, suggesting that specific sub-dimensions of eating awareness may be related to body weight.

Although no significant association was found between overall mindful eating and ON tendency, significant relationships were identified at the sub-factor level. In particular, eating control and eating discipline were positively associated with ON tendency, whereas thoughtless eating demonstrated a negative association. These findings suggest that orthorexic tendency may be linked not to holistic mindful awareness but rather to specific control-oriented and cognitive components of eating behavior.

Taken together, the results highlight the multidimensional nature of ON and underscore the importance of considering gender and specific mindful eating sub-factors when evaluating orthorexic tendencies. Future longitudinal and methodologically rigorous studies are warranted to further clarify these associations.

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