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Is there a relationship between orthorexia nervosa, body dissatisfaction, anxiety about health and eating attitudes among adults?

Özge Mengi Çelik [1*], Emine Merve Ekici [1], Tevfik Koçak [2]

[1] Department of Nutrition and Dietetics, Faculty of Gülhane Health Sciences, University of Health Sciences, Ankara, TÜRKİYE
[2] Department of Nutrition and Dietetics, Faculty of Health Sciences, Gümüşhane University, Gümüşhane, TÜRKİYE
***Corresponding Author:** ozge.mengicelik@sbu.edu.tr

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ABSTRACT

Objective: This study aimed to evaluate the relationship between orthorexia nervosa, body dissatisfaction, health anxiety, and eating attitudes.

Materials and methods: This cross-sectional study was conducted with 836 adults aged 18-65 years. The research data were collected with the help of a web-based survey form created by the researchers. The general characteristics and anthropometric measurements of the individuals were questioned. Orthorexic tendency (ORTO-11) scale, eating attitude (eating attitude test-26 [EAT-26]), health anxiety (health anxiety inventory) and body satisfaction (Stunkard figure rating scale) were evaluated with the help of scales.

Results: The mean age of the individuals was 30.50 ± 11.70 years. 44.9% of the individuals had orthorexic tendency. 31.7% of individuals had disordered eating behavior and 33.3% of individuals were dissatisfied with their body size. When the factors that could affect the ORTO-11 scale score, EAT-26 score and health anxiety inventory score were evaluated with linear regression analysis, all models were statistically significant (respectively $R^2 = 0.173$, $p < 0.001$, $R^2 = 0.211$, $p < 0.001$; and $R^2 = 0.216$, $p < 0.001$). It was determined that EAT-26 score had an effect on the ORTO-11 scale score. It was determined that body mass index, ORTO-11 scale score and health anxiety inventory score had an effect on the EAT-26 score. It was determined that gender, EAT-26 score and Stunkard figure rating scale score had an effect on the health anxiety inventory score ($p < 0.05$).

Conclusion: It was determined that eating attitudes have a direct impact on the orthorexia nervosa and health anxiety affects eating attitudes. This study presents significant data that can guide future therapeutic research on enhancing individuals' eating attitudes, and behaviors, addressing emerging health anxiety, managing perceived body image, and promoting long-term overall health.

Keywords: orthorexia nervosa, body dissatisfaction, health anxiety, eating attitudes

INTRODUCTION

Orthorexia nervosa, which was first described in 1997, is an effort to consume pure and healthy food, focusing on the quality rather than the quantity of food [1]. Orthorexia nervosa is characterized by behaviors such as constant preoccupation with healthy foods, avoiding consumption of genetically modified foods as well as foods with unnatural ingredients, carcinogens, additives, dyes, hormones, high amounts of salt, sugar and unhealthy fats, being more concerned about one's health than normal, and extra attention to healthy food purchasing, preparation and cooking methods [2, 3]. Although it is not included in the diagnostic and statistical manual of mental disorders and the international statistical classification of diseases and is not considered an official eating disorder, there is an ongoing debate in the literature about whether orthorexia nervosa should be classified as a typical or atypical eating disorder, obsessive-compulsive disorder or a mental disorder, and it has a significant number of symptoms in common with these [4-7]. Studies have shown that the prevalence of orthorexia nervosa is associated with increased eating disorders [8, 9]. Literature indicate that these disorders share similar clinical symptoms, such as adherence to diet as an indicator of self-discipline and constant obsessive thoughts about food [10]. However, while orthorexic individuals are usually obsessively concerned with the quality and purity of food, individuals with eating disorders focus primarily on the amount of food [11]. The results regarding the direction of the relationship between orthorexia nervosa and eating disorders emphasize that orthorexia nervosa can occur before or after eating disorders [12, 13].

Changes in individuals' eating habits may lead to the perception of impaired body image [2, 14]. In general terms, body image is a multidimensional psychological concept related to the experience of one's own body, including physical appearance, and includes attitudes and perceptions towards one's body [15, 16]. Factors that affect body image emotionally

include body satisfaction or dissatisfaction [16]. Body dissatisfaction expresses the negative thoughts and feelings of individuals about their bodies and usually results from the incompatibility between the way individuals perceive their bodies and the ideal body shape they perceive [2]. Body dissatisfaction, impaired body image and obsession with thinness are at the center of clinically diagnosed eating behavior disorders such as anorexia nervosa, bulimia nervosa and binge eating disorder [16]. However, there are limited number of studies in the literature on how non-clinical disorders such as orthorexia nervosa affect body satisfaction [5, 17, 18]. In some of the studies in which orthorexic tendency (ORTO-11) scale was used in the evaluation of orthorexia nervosa and various scales (body dysmorphic disorder questionnaire and Stunkard scale) were used in the evaluation of body dissatisfaction, no relationship was found between orthorectic tendencies and body dissatisfaction [19, 20], while in some studies it was found that orthorectic tendency increased body dissatisfaction [21, 22].

Anxiety and depression frequently occur as psychiatric conditions within eating behavior disorders [23]. Mood disorders, obsessive-compulsive disorders, and eating behavior disorders have been identified as predisposing factors for orthorexia nervosa [24]. In anorexia nervosa and bulimia nervosa, dietary concerns primarily revolve around food quantity in relation to body weight and shape, whereas in orthorexia nervosa, the primary objective of the diet is focused on achieving health [25]. Individuals with orthorexia nervosa exhibit persistent preoccupation with the quality and composition of their meals, typically rigidly avoiding foods they deem to be 'unhealthy'. When there is a compromise in food purity, it triggers intense frustration and a persistent state of anxiety related to maintaining control over food. High comorbidity has been observed between anxiety and eating disorders. Low self-esteem and impaired stress reactivity are suggested as significant mechanisms that partially explain the relationship between anxiety and eating disorders [3]. Furthermore, literature reports suggest that anxiety can serve as a risk factor for the development of eating disorders, influencing their onset, and sharing common characteristics with them [26].

Perfectionism and obsession with consuming a healthy diet seen in orthorexia nervosa may lead to limiting food intake in the diet over time, causing physical, psychosocial and social changes and may affect negative health outcomes related to malnutrition. A positive change in dietary habits and behaviors is an important factor in reducing the risk of chronic diseases and protecting general health [27]. Considering all these issues and the effects of eating disorders on psychological, social and environmental well-being, the primary aim of this study was to examine the relationship between orthorexia nervosa and eating behavior, body dissatisfaction and health anxiety. There is no holistic study in the literature that addresses all of these issues together. This study is the first to evaluate the relationship between orthorexia nervosa and eating behavior, body dissatisfaction and health anxiety. Therefore, it is thought that this study will contribute to the scientific literature.

Study Questions

1. Health anxiety, body dissatisfaction, eating attitudes, and orthorexic tendency: Which factor affects the other?
2. Are there differences in characteristic features according to orthorexic tendency in adults?
3. Are there differences in characteristic features according to eating attitude in adults?
4. Are there differences in characteristic features according to body satisfaction in adults?

MATERIALS AND METHODS

This cross-sectional study was conducted with 836 adults aged 18-65 years between January and July 2024. Before starting the study, ethical approval with the decision number 17/11 from Trakya University Faculty of Medicine Dean's Office of Ethics Committee for Non-Invasive Scientific Research. The research data were collected with the help of a web-based survey form (Google Form) created by the researchers and taken from the Edirne Province of Turkey using the snowball sampling method. Survey data were collected via social media tools Twitter, Facebook, WhatsApp, and Instagram. The inclusion criteria for the study are as follows: individuals aged between 18 and 65 years, with internet access, who ticked the "I agree to participate in this study voluntarily" tab at the beginning of the online survey, and who complete the survey in its entirety were included in the study. Individuals answered the survey questions in about 15 minutes. All procedures in the study were carried out in accordance with the Declaration of Helsinki. The general characteristics (biological gender, age, and education level) and anthropometric measurements (body weight and height) of the individuals were questioned. Orthorexic tendency, eating attitude, health anxiety and body satisfaction were evaluated with the help of scales.

Anthropometric Measurements

Anthropometric measurements (body weight and height) were taken based on the self-reports of individuals. Individuals were informed about how to take anthropometric measurements in the questionnaire form. The body mass index (BMI) value was calculated by dividing the body weight by the square of the height. BMI below 18.50 kg/m^2 was classified as underweight, between 18.50-24.99 kg/m^2 as normal, between 25.0-29.99 kg/m^2 as overweight, and above 30.0 kg/m^2 as obese [28].

Orthorexic Tendency

Individuals' orthorexic tendency was evaluated using the ORTO-11 scale. The scale was first developed in [29]. It was determined by [30] that the ORTO-11 scale has an acceptable level of functionality in terms of its structural features and internal consistency in Turkish. The Cronbach's alpha coefficient of the Turkish version of the scale was calculated to be 0.62. Scale questions investigate individuals' behaviors in choosing, purchasing, preparing, and consuming foods that they consider healthy. The scale is 4-likert type. Total possible scores for ORTO-11 range between 0 and 44 points. Lower scores indicate an orthorexic tendency. The cut-off point of the scale was determined as 27 points. In other words, scores of 27 and below are associated with orthorexic tendency. Based on this cut-off point, participants were divided into two groups, orthorexic individuals and normal individuals [30].

Eating Attitude

Eating attitude was assessed using the eating attitude test-26 (EAT-26). The scale was developed by [31]. The Turkish validity and reliability study of the scale was conducted by [32]. The Cronbach's alpha value of the scale is 0.84. In addition to being widely used in clinical and observational studies, EAT-26 is defined as an effective screening tool in determining the risk of eating disorders. The scale consists of 26 items and is evaluated with a 6-item Likert-type rating. As the score obtained from the scale increases, the risk of eating attitude disorder increases. The cut-off point in the scale is 20. A score ≥ 20 is defined as disordered eating behavior, while a score < 20 is considered as normal eating behavior [32].

Health anxiety

Health anxiety was assessed using the health anxiety inventory. The scale was developed by [33]. The Turkish validity and reliability study of the scale was conducted by [34]. The Cronbach's alpha value of the scale is 0.918. The health anxiety scale is a self-report scale consisting of 18 items. The 14 items of the scale question individuals' mental state. In the remaining 4 questions, individuals are asked to speculate on what their mental state might be, assuming they have a serious illness, and the questioning is made accordingly. The scale ranges from 0 to 3 for each item and the maximum score is 54. High scores obtained from the scale indicate high levels of health anxiety [34].

Body Satisfaction

The Stunkard figure rating scale was used to determine individuals' body dissatisfaction [35]. The Turkish validity and reliability study of the scale has been conducted [36]. The scale includes 9 figures for both genders, ranging from extreme thinness to obesity, from which participants can choose both their current and ideal body figures. Individuals' body dissatisfaction score was determined by the difference between their ideal body figure score and their body figure score. The obtained scores of 0 and 1 were defined as body satisfaction, and > 1 point was defined as body dissatisfaction [35].

Statistical Analysis

The G*Power (version 3.1.9.7, Universitat Düsseldorf, Düsseldorf, Germany) was used for post-hoc power analysis, and the effect size was calculated for the correlation between the ORTO-11 scale score and EAT-26 score. According to the analysis, the study power (1-β) was 96% for the statistical significance of two-sided alpha of 5%.

The statistical package for the social sciences (version 22.0) software was used for all analyses. Data were evaluated with descriptive statistics such as mean, standard deviation, number and percentage. Distribution analysis of the data was performed using the histogram, coefficient of variation ratio, skewness, kurtosis, and Kolmogorov-Smirnov tests. Linear regression model was performed for prediction of orthorexic tendency, eating attitude and health anxiety. The model fit was assessed using appropriate residual and goodness-of-fit statistics. Assumption tests were performed for the models and all assumptions were met. Variables that showed significant correlations with the dependent variable were included in the regression analysis. All selected independent variables were entered into the model simultaneously (enter method). Both significant and non-significant predictors are presented in the regression table to provide a comprehensive view of the results. The mean differences between independent groups were evaluated by independent samples t-test. Chi-square test was applied for differences between categorical variables. The results were evaluated at the 95% confidence interval and $p < 0.05$ significance level.

Table 1. General characteristics of individuals

Variables	N (%)
Gender	
Female	611 (73.1)
Male	225 (26.9)
Education level	
Primary school	25 (3.0)
Middle school	29 (3.5)
High school	143 (17.1)
University	580 (69.4)
Msc/PhD	59 (7.1)
BMI classification	
Underweight	49 (5.9)
Normal	500 (59.8)
Overweight	209 (25.0)
Obese	78 (9.3)
Orthorexic tendency	
Orthorexic	375 (44.9)
Normal	461 (55.1)
Eating attitude	
Normal eating behavior	571 (68.3)
Disordered eating behavior	265 (31.7)
Body satisfaction	
Satisfied with body size	558 (66.7)
Dissatisfied with body size	278 (33.3)
	Mean ± standard deviation
Age (years)	30.50 ± 11.70
BMI (kg/m^2)	23.80 ± 4.20
ORTO-11 scale score	28.10 ± 4.97
EAT-26 score	16.90 ± 12.85
Health anxiety inventory score	16.60 ± 7.58

RESULTS

The general characteristics of the individuals are given in **Table 1**. The mean age of the individuals was 30.50 ± 11.70 years, and the mean BMI was 23.80 ± 4.20 kg/m^2. The majority of individuals were university graduates (69.4%) and normal body weight (59.8%). 44.9% of the individuals had orthorexic tendency. 31.7% of individuals had disordered eating behavior and 33.3% of individuals were dissatisfied with their body size. The mean health anxiety inventory score was 16.60 ± 7.58.

When the factors that could affect the ORTO-11 scale score, EAT-26 score and health anxiety inventory score were evaluated with linear regression analysis, all models were deemed important (respectively $R^2 = 0.173$, $p < 0.001$; $R^2 = 0.211$, $p < 0.001$; and $R^2 = 0.216$, $p < 0.001$). It was determined that EAT-26 score had an effect on the ORTO-11 scale score. Higher EAT-26 score was associated with lower ORTO-11 scale score. It was determined that BMI, ORTO-11 scale score and health anxiety inventory score had an effect on the EAT-26 score. Higher BMI and health anxiety inventory score were associated with higher EAT-26 score, whereas higher ORTO-11 scale score was associated with lower EAT-26 score. It was determined that gender, EAT-26 score and Stunkard figure rating scale score had an effect on the health anxiety inventory score. Health anxiety inventory score is higher in females. Higher EAT-26

Table 2. Linear regression model for orthorexic tendency, eating attitude and health anxiety prediction

	Model	Beta	t	p-value
ORTO-11 scale score (R^2 = 0.173 & p < 0.001*)	BMI (kg/m^2)	-0.059	-1.532	0.126
	EAT-26 score	-0.419	-12.956	<0.001*
	Health anxiety inventory score	-0.031	-0.966	0.335
	Stunkard figure rating scale score	-0.056	-1.452	0.147
EAT-26 score (R^2 = 0.211 & p < 0.001*)	BMI (kg/m^2)	0.114	3.316	0.001*
	ORTO-11 scale score	-0.402	-13.019	<0.001*
	Health anxiety inventory score	0.143	4.593	<0.001*
	Stunkard figure rating scale score	0.033	0.948	0.343
Health anxiety inventory score (R^2 = 0.216 & p < 0.001*)	Gender	-0.082	-2.290	0.022*
	BMI (kg/m^2)	0.027	0.669	0.203
	EAT-26 score	0.175	4.653	<0.001*
	ORTO-11 scale score	-0.031	-0.820	0.112
	Stunkard figure rating scale score	0.088	2.300	0.022*

Note. Variable values: Gender (male = 1 &, female = 0) & *p < 0.05

Table 3. Evaluation of individuals' characteristics according to orthorexic tendency

Variables		Orthorexic (n = 375)	Normal (n = 461)	p-value
Gender	Female	268 (71.5%)	343 (74.4%)	0.341
	Male	107 (28.5%)	118 (25.6%)	
Age (years)		30.00 ± 12.23	30.80 ± 11.25	0.353
Education level	Primary school	15 (4.0%)	10 (2.2%)	0.192
	Middle school	16 (4.3%)	13 (2.8%)	
	High school	70 (18.7%)	73 (15.8%)	
	University	246 (65.6%)	334 (72.5%)	
	MSc/PhD	28 (7.5%)	31 (6.7%)	
BMI (kg/m^2)		23.80 ± 4.42	23.80 ± 4.01	0.927
BMI classification	Underweight	29 (7.7%)	20 (4.3%)	0.130
	Normal	215 (57.3%)	285 (61.8%)	
	Overweight	92 (24.5%)	117 (25.4%)	
	Obese	39 (10.4%)	39 (8.5%)	
EAT-26 score		20.30 ± 13.80	12.80 ± 10.18	< 0.001*
Health anxiety inventory score		16.30 ± 7.78	16.70 ± 7.42	0.732
Stunkard figure rating scale score		1.20 ± 1.28	1.20 ± 1.07	0.747

Note.*p < 0.05

Table 4. Evaluation of individuals' characteristics according to eating attitude

Variables		Normal eating behavior (n = 571)	Disordered eating behavior (n = 265)	p-value
Gender	Female	417 (73.0%)	194 (73.2%)	0.957
	Male	154 (27.0%)	71 (26.8%)	
Age (years)		29.90 ± 11.57	31.60 ± 11.92	0.079
Education level	Primary school	15 (2.6%)	10 (3.8%)	0.610
	Middle school	17 (3.0%)	12 (4.5%)	
	High school	95 (16.6%)	48 (18.1%)	
	University	403 (70.6%)	177 (66.8%)	
	MSc/PhD	41 (7.2%)	18 (6.8%)	
BMI (kg/m^2)		23.40 ± 3.98	24.80 ± 4.49	< 0.001*
BMI classification	Underweight	39 (6.8%)	10 (3.8%)	< 0.001*
	Normal	360 (63.0%)	140 (52.8%)	
	Overweight	131 (22.9%)	78 (29.4%)	
	Obese	41 (7.2%)	37 (14.0%)	
ORTO-11 scale score		30.40 ± 4.91	27.10 ± 4.63	< 0.001*
Health anxiety inventory score		15.90 ± 6.92	18.10 ± 8.69	< 0.001*
Stunkard figure rating scale score		1.10 ± 1.18	1.40 ± 1.14	0.002*

Note.*p < 0.05

score and Stunkard figure rating scale were associated with higher health anxiety inventory score (p < 0.05) (**Table 2**).

Evaluation of individuals' characteristics according to orthorexic tendency is given in **Table 3**. There was a statistically significant difference between the groups in terms of EAT-26 score (p < 0.05).

Evaluation of individuals' characteristics according to eating attitude is given in **Table 4**. There was a statistically significant difference between the groups in terms of BMI, BMI classification, ORTO-11 scale score, health anxiety inventory score and Stunkard figure rating scale score (p < 0.05).

Evaluation of individuals' characteristics according to body satisfaction is given in **Table 5**. There was a statistically significant difference between the groups in terms of age, BMI, BMI classification, EAT-26 score and health anxiety inventory score (p < 0.05).

Table 5. Evaluation of individuals' characteristics according to body satisfaction

Variables		Satisfied with body size (n = 558)	Dissatisfied with body size (n = 278)	p-value
Gender	Female	403 (72.2%)	208 (74.8%)	0.425
	Male	155 (27.8%)	70 (25.2%)	
Age (years)		28.90 ± 10.95	33.60 ± 12.52	< 0.001*
Education level	Primary school	14 (2.5%)	11 (4.0%)	0.480
	Middle school	13 (2.3%)	16 (5.8%)	
	High school	86 (15.4%)	57 (20.5%)	
	University	412 (73.8%)	168 (60.4%)	
	MSc/PhD	33 (5.9%)	26 (9.4%)	
BMI (kg/m^2)		22.50 ± 3.21	26.50 ± 4.66	< 0.001*
BMI classification	Underweight	38 (6.8%)	11 (4.0%)	0.202
	Normal	404 (72.4%)	96 (34.5%)	
	Overweight	101 (18.1%)	108 (38.8%)	
	Obese	15 (2.7%)	63 (22.7%)	
ORTO-11 scale score		28.00 ± 4.78	28.30 ± 5.33	< 0.001*
EAT-26 score		15.70 ± 12.10	19.50 ± 13.92	0.016*
Health anxiety inventory score		16.10 ± 7.02	17.60 ± 8.53	0.002*

Note.*p < 0.05

DISCUSSION

The present study showed that eating attitude was a factor affecting orthoretic tendency. BMI, orthorectic tendency and health anxiety were effective factors in eating attitude. At the same time, gender, eating attitude and body dissatisfaction were the factors affecting health anxiety. Individuals with disordered eating behavior had more body dissatisfaction. Individuals with body dissatisfaction had higher mean age, BMI, scores of EAT-26 and health anxiety. These results are important as they shed light on eating behavior disorders and related factors.

In recent years, the growing interest in healthy eating has contributed to an increase in cases of orthorexia nervosa [37, 38]. Orthorexia nervosa meets the criteria of the eating disorder spectrum [39]. According to this study, orthorexic tendency and disordered eating behavior were found to be 44.9% and 31.7% in adults, respectively. Studies in the literature show that orthorexic tendencies [40, 41] and disordered eating behavior [42, 43] are high among adult individuals. Also, previous studies demonstrated that orthorexia nervosa is associated with disordered eating attitudes [8, 9]. In this study, a bidirectional relationship was found between orthorexia nervosa and disordered eating behavior. In the literature, it is stated that there is a bidirectional relationship between disordered eating behavior and orthorexia nervosa due to the common symptoms such as perfectionism, cognitive endurance, impaired function, increased anxiety level, high need to exert control and impairing working memory [10, 44]. Some studies have suggested that the presence of orthorexia nervosa may be a risk factor for the development of eating disorders [10, 45]. In a study, a history of eating disorders was observed more frequently in patients with orthorexia nervosa compared to the control group [10]. In [46], it emphasized that the perfectionism tendency and the desire to have a perfect body image seen in orthorexia nervosa, are related to eating behavior disorder. As seen, the results of this study are similar to the literature.

Negative thoughts and feelings about one's body are defined as body dissatisfaction [47]. Body dissatisfaction can be present in individuals across the adult life span [48]. In this study, it was determined that the mean age of individuals with body dissatisfaction was higher. The importance individuals attach to their physical appearance decreases with age [47, 49], and this may result in an increase in BMI, causing individuals to experience greater body dissatisfaction. Individuals' body dissatisfaction may stem from their desire to be thinner [50]. In [51], it was determined that individuals' body dissatisfaction increased with age, and this was explained by an increase in BMI with age.The connection between body weight and body image is complex. The study in [52] argues that body image affects the psychological problems and quality of life related to obesity. Furthermore, although body image is a subjective psychological phenomenon, it is also largely influenced by social experiences. Contemporary Western societies tend to idealize thinness, and the media's portrayal of the ideal female or male body is assumed to have a great influence on the way individuals evaluate and experience their physical appearance. Due to the negative stereotypes that come with not meeting society's body ideals, it is not surprising that body dissatisfaction is particularly common in overweight or obese individuals and is even often associated with eating disorders [53]. In this study, it was observed that the average BMI values were higher in individuals with high body dissatisfaction, and it was determined that overweight and obese people had higher body dissatisfaction. In a similar study, overweight and obese women reported more body image dissatisfaction than normal weight women [52]. In a meta-analysis of 17 studies comparing body dissatisfaction between normal and obese individuals, it was found that obese individuals experienced more body dissatisfaction than individuals with normal body weight [53].

Although eating disorders are most common in adolescence or early adulthood, they also affect many people in adulthood [54]. The causes of eating disorders are not fully understood [55]. However, it is thought that socio-cultural and biological factors largely affect the individual's eating pattern. In terms of socio-cultural factors, societies that equate beauty with a thin body cause individuals to increase their tendency to control their body weight and contribute to the development of eating disorders. Cultural factors that affect eating disorders focus on understanding the thoughts, feelings and behaviors that contribute to disorders in terms of body dissatisfaction, fear of obesity and inability to control nutrition [56]. It has been suggested that individuals with eating disorders may experience body dissatisfaction, such as body weight, body shape, and disturbances in thoughts and images related to food. Body dissatisfaction, social pressure to achieve a thin body and shape, combined with low self-esteem and the

importance of perfectionism, emerge as a factor affecting the development of eating disorders [56, 57]. A meta-analysis has shown that body dissatisfaction is one of the most consistent and powerful risk factors for eating disorders [58]. In a study conducted on young adults and examining body dissatisfaction and eating disorders with the EAT-26 scale; body dissatisfaction showed a positive correlation with the total eating disorder score and all subscores. The study also associated body dissatisfaction with an increased risk of eating disorders [56]. In our study, it was observed that eating disorder scores were higher in individuals with body dissatisfaction, and in addition, the results of the linear regression analysis supported the two-way relationship between the factors affecting the eating disorder, with body dissatisfaction being among the factors affecting the eating disorder. Previous studies have shown that individuals with higher levels of body dissatisfaction are more likely to engage in disordered eating behaviors such as dieting, unhealthy eating, and weight control practices [59, 60]. On the other hand, negative emotional states such as depression and anxiety, which are frequently seen in body dissatisfaction, also indirectly cause impaired eating behavior. The literature indicates that body dissatisfaction is positively associated with disordered eating behaviors such as restricted eating, emotional eating, and external eating, and that this relationship is supported by depression [61]. In our study, the relationship between body dissatisfaction and eating disorders and the higher prevalence of health anxiety in individuals with both body dissatisfaction and eating disorders support these results. Additionally, eating attitude and body dissatisfaction are another important factors affecting health anxiety in this study. A study examining the correlation between anxiety and eating attitudes emphasised that interventions targeting health anxiety could potentially mitigate eating disorders and obesity in the population [62]. Another study examining the correlation between anxiety sensitivity and eating disorders found that those who reported high levels of anxiety also had more severe symptoms of eating disorders [63]. On the other hand, there is a strong relationship between anxiety and gender [64, 65]. Similar to this study, studies in the literature have also found that health anxiety symptoms are more common in women than in males [64, 66]. The high level of anxiety in women is attributed to various reasons. According to the gonadic theory, women's hormone levels fluctuate cyclically over a much wider range than men's and affect brain regions known to play a role in regulating mood and behavior [65]. In a study conducted in Türkiye, it was stated that the reason why health anxiety is higher in women is that women cannot easily express their concerns due to the influence of culture [66].

The present study has some strengths. First, the study was conducted using a large sample size. Second, the association of health anxiety with orthorexic tendencies, eating attitudes and body satisfaction has brought a different perspective to the literature. It seems that existing studies are mostly conducted with children and adolescents. Conducting the study in the adult population enriched the literature. However, this study has several limitations. First, the lack of a causal link due to its cross-sectional nature is a limitation of the study. Although the cross-sectional design limits the ability to infer causality, future research could address this limitation by employing longitudinal or experimental study designs. Second, we evaluated orthorexic tendency with the ORTO-11 scale. Although the ORTO-11 scale is widely used in the assessment of orthorexic tendency, it is a measurement tool that should be evaluated with caution due to the criticisms in the literature. Another limitation is that only individuals with internet access were included in the study because the study data was collected online. Finally, although how anthropometric measurements should be taken was explained in the online survey, another limitation is that the data was taken based on self-reports of individuals. Nevertheless, the findings of our study will shed light on future studies.

CONCLUSION

In conclusion, the present study determined that 44.9% of adult individuals had orthorexic tendencies, 31.7% had disordered eating behaviors, and 33.3% of individuals were dissatisfied with their body size. Eating attitude was a factor affecting orthoretic tendency. BMI, orthorectic tendency and health anxiety were effective factors in eating attitude. In addition, gender, eating attitude and body dissatisfaction were the factors affecting health anxiety. Individuals with disordered eating behavior had more body dissatisfaction. Individuals with body dissatisfaction had higher mean age, BMI, scores of EAT-26 and health anxiety.

Orthorexia nervosa and disordered eating behaviors are commonly observed among adults in contemporary society. The prevalence of orthorexia nervosa is associated with a higher prevalence of eating disorders. Individuals with body dissatisfaction may be more susceptible to health anxiety and eating behavior disorders. Similarly, individuals with disordered eating attitudes may be more susceptible to health anxiety, orthorexic tendencies, and body dissatisfaction. These important issues should be taken into consideration in the treatment of both orthorexia nervosa and disordered eating behaviors in the clinic, and a holistic treatment approach should be adopted. This study provides important data that can guide future therapeutic research on improving individuals' eating disorders, eating attitudes, and behaviors, addressing emerging health anxiety, managing perceived body image, and improving long-term general health. Considering the prevalence of orthorexia nervosa and disordered eating behaviors in adults in societies, it is very important to well define all factors that may be associated with this issue and to conduct further studies on this subject. As nutritionists, we must properly inform individuals about proper nutrition and body image issues imposed by today's societies.

Author contributions: ÖMÇ: conceptualization, data curation, formal analysis, supervision, validation, writing–original draft, writing – review & editing; **EME & TK:** conceptualization, data curation, writing – original draft. All authors have sufficiently contributed to the study and agreed with the results and conclusions.

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Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

REFERENCES

1. Fugh-Berman A. Health food junkies: Orthorexia nervosa: Overcoming the obsession with healthful eating. JAMA. 2001;285(17). https://doi.org/10.1001/jama.285.17.2255-JBK0502-2-1
2. Öztürk EE. Evaluating the relationship between tendencies of orthorexia nervosa and body dissatisfaction among adults. J Adv Res Health Sci. 2023;6(2):186-91.
3. Duran S. The relationships between orthorexia nervosa and body image in nursing students. J Youth Res. 2022;10(26):1-16.
4. Cena H, Barthels F, Cuzzolaro M, et al. Definition and diagnostic criteria for orthorexia nervosa: A narrative review of the literature. Eat Weight Disord. 2019;24(2):209-46. https://doi.org/10.1007/s40519-018-0606-y PMid:30414078
5. He J, Zhao Y, Zhang H, Lin Z. Orthorexia nervosa is associated with positive body image and life satisfaction in Chinese elderly: Evidence for a positive psychology perspective. Int J Eat Disord. 2021;54(2):212-21. https://doi.org/10.1002/eat.23400 PMid:33135212
6. Regier DA, Kuhl EA, Kupfer DJ. The DSM-5: Classification and criteria changes. World Psychiatry. 2013;12(2):92-8. https://doi.org/10.1002/wps.20050 PMid:23737408 PMCid:PMC3683251
7. Düplois D, Brosig L, Hiemisch A, et al. Distribution and clinical comparison of restrictive feeding and eating disorders using ICD-10 and ICD-11 criteria. Int J Eat Disord. 2023;56(9):1717-29. https://doi.org/10.1002/eat.23994 PMid:37243388
8. Caferoglu Z, Toklu H. Orthorexia nervosa in Turkish dietitians and dietetic students. Encephale. 2022;48(1):13-9. https://doi.org/10.1016/j.encep.2020.12.006 PMid:33814168
9. Gonidakis F, Poulopoulou C, Michopoulos I, Varsou E. Validation of the Greek ORTO-15 questionnaire for the assessment of orthorexia nervosa and its relation to eating disorders symptomatology. Eat Weight Disord. 2021;26(8):2471-9. https://doi.org/10.1007/s40519-020-01080-6 PMid:33475990
10. Koven NS, Abry AW. The clinical basis of orthorexia nervosa: Emerging perspectives. Neuropsychiatr Dis Treat. 2015;11:385-94. https://doi.org/10.2147/NDT.S61665 PMid:25733839 PMCid:PMC4340368
11. Aksoydan E, Camci N. Prevalence of orthorexia nervosa among Turkish performance artists. Eat Weight Disord. 2009;14(1):33-7. https://doi.org/10.1007/BF03327792 PMid:19367138
12. Cartwright MM. Eating disorder emergencies: Understanding the medical complexities of the hospitalized eating disordered patient. Crit Care Nurs Clin North Am. 2004;16(4):515-30. https://doi.org/10.1016/S0899-5885(04)00071-1 PMid:15571940
13. Segura-Garcia C, Ramacciotti C, Rania M, et al. The prevalence of orthorexia nervosa among eating disorder patients after treatment. Eat Weight Disord. 2015;20(2):161-6. https://doi.org/10.1007/s40519-014-0171-y PMid:25543324
14. Baysal I, Kızıltan G. The determination of the relationship between food neophobia and orthorexia nervosa tendencies and nutritional status of individuals who engage in sports. J Nutr Diet. 2020;48(3):48-55.
15. Thompson JK. The (mis) measurement of body image: Ten strategies to improve assessment for applied and research purposes. Body Image. 2004;1(1):7-14. https://doi.org/10.1016/S1740-1445(03)00004-4 PMid:18089137
16. Pauzé A, Plouffe-Demers M-P, Fiset D, Saint-Amour D, Cyr C, Blais C. The relationship between orthorexia nervosa symptomatology and body image attitudes and distortion. Sci Rep. 2021;11(1):13311. https://doi.org/10.1038/s41598-021-92569-2 PMid:34172763 PMCid:PMC8233361
17. Bratman S, Knight D. Health food junkies: Overcoming the obsession with healthful eating. New York City, NY: Broadway Books; 2000.
18. Freire GLM, da Silva Paulo JR, da Silva AA, Batista RPR, Alves JFN, do Nascimento Junior JRA. Body dissatisfaction, addiction to exercise and risk behaviour for eating disorders among exercise practitioners. J Eat Disord. 2020;8:23. https://doi.org/10.1186/s40337-020-00300-9 PMid:32528680 PMCid:PMC7285560
19. Bundros J, Clifford D, Silliman K, Morris MN. Prevalence of Orthorexia nervosa among college students based on Bratman's test and associated tendencies. Appetite. 2016;101:86-94. https://doi.org/10.1016/j.appet.2016.02.144 PMid:26923745
20. Bibiloni MdM, Coll JL, Pich J, Pons A, Tur JA. Body image satisfaction and weight concerns among a Mediterranean adult population. BMC Public Health. 2017;17(1):39. https://doi.org/10.1186/s12889-016-3919-7 PMid:28061761 PMCid:PMC5217589
21. Brytek-Matera A, Donini LM, Krupa M, Poggiogalle E, Hay P. Erratum to: Orthorexia nervosa and self-attitudinal aspects of body image in female and male university students. J Eat Disord. 2016;4:16. https://doi.org/10.1186/s40337-016-0105-3 PMid:27186373 PMCid:PMC4868107
22. Barthels F, Kisser J, Pietrowsky R. Orthorexic eating behavior and body dissatisfaction in a sample of young females. Eat Weight Disord. 2021;26(6):2059-63. https://doi.org/10.1007/s40519-020-00986-5 PMCid:PMC8496582
23. Solmi M, Collantoni E, Meneguzzo P, Degortes D, Tenconi E, Favaro A. Network analysis of specific psychopathology and psychiatric symptoms in patients with eating disorders. Int J Eat Disord. 2018;51(7):680-92. https://doi.org/10.1002/eat.22884 PMid:29846016
24. Strahler J, Hermann A, Walter B, Stark R. Orthorexia nervosa: A behavioral complex or a psychological condition? J Behav Addict. 2018;7(4):1143-56. https://doi.org/10.1556/2006.7.2018.129 PMid:30556782 PMCid:PMC6376377
25. Goutaudier N, Rousseau A. [Othorexia: A new type of eating disorder?] Presse Med. 2019;48(10):1065-71. https://doi.org/10.1016/j.lpm.2019.07.005 PMid:31653538
26. Swinbourne J, Hunt C, Abbott M, Russell J, St Clare T, Touyz S. The comorbidity between eating disorders and anxiety disorders: Prevalence in an eating disorder sample and anxiety disorder sample. Aust N Z J Psychiatry. 2012;46(2):118-31. https://doi.org/10.1177/0004867411432071 PMid:22311528
27. Agopyan A, Kenger EB, Kermen S, Ulker MT, Uzsoy MA, Yetgin MK. The relationship between orthorexia nervosa and body composition in female students of the nutrition and dietetics department. Eat Weight Disord. 2019;24(2):257-66. https://doi.org/10.1007/s40519-018-0565-3 PMid:30159794

28. Madden A, Smith S. Body composition and morphological assessment of nutritional status in adults: A review of anthropometric variables. J Hum Nutr Diet. 2016;29(1):7-25. https://doi.org/10.1111/jhn.12278 PMid:25420774
29. Donini LM, Marsili D, Graziani MP, Imbriale M, Cannella C. Orthorexia nervosa: A preliminary study with a proposal for diagnosis and an attempt to measure the dimension of the phenomenon. Eat Weight Disord. 2004;9(2):151-7. https://doi.org/10.1007/BF03325060 PMid:15330084
30. Arusoğlu G, Kabakçi E, Köksal G, Merdol TK. Ortoreksiya nervoza ve ORTO-11'in Türkçeye uyarlama çalışması [Orthorexia nervosa and ORTO-11 adaptation study into Turkish]. Turk Psikiyatri Derg. 2008;19(3):283-91.
31. Garner DM, Garfinkel PE. The eating attitudes test: An index of the symptoms of anorexia nervosa. Psychol Med. 1979; 9(2):273-9. https://doi.org/10.1017/S0033291700030762 PMid:472072
32. Ergüney-Okumuş FE, Sertel-Berk HÖ. Yeme tutum testi kısa formunun (YTT-26) üniversite örnekleminde Türkçeye uyarlanması ve psikometrik özelliklerinin değerlendirilmesi [Adaptation of the short form of the eating attitude test (YTT-26) into Turkish in a university sample and evaluation of its psychometric properties]. Psikol Çalışmaları. 2019;40(1):57-78. https://doi.org/10.26650/SP2019-0039
33. Salkovskis PM, Rimes KA, Warwick HM, Clark D. The health anxiety inventory: Development and validation of scales for the measurement of health anxiety and hypochondriasis. Psychol Med. 2002;32(5):843-53. https://doi.org/10.1017/S0033291702005822 PMid:12171378
34. Aydemir Ö, Kirpinar I, Tülay S, Uykur B, Cengisiz C. Reliability and validity of the Turkish version of the health anxiety inventory. Noro Psikiyatr Ars. 2013;50(4):325-31. https://doi.org/10.4274/npa.y6383 PMid:28360565 PMCid: PMC5363424
35. Stunkard AJ, Sørensen T, Schulsinger F. Use of the Danish adoption resister for the study of obesity and thinness. Assoc Res Nerv Ment Dis. 1983;60:115-20.
36. Uğur G. Üniversite öğrencilerinde atılganlık ile beden algısı ilişkisi [The relationship between assertiveness and body image among university students] [Master's thesis]. Izmir: Ege University; 1996.
37. Niedzielski A, Kaźmierczak-Wojtaś N. Prevalence of orthorexia nervosa and its diagnostic tools–A literature review. Int J Environ Res Public Health. 2021;18(10):5488. https://doi.org/10.3390/ijerph18105488 PMid:34065506 PMCid:PMC8160773
38. Gkiouleka M, Stavraki C, Sergentanis TN, Vassilakou T. Orthorexia nervosa in adolescents and young adults: A literature review. Children. 2022;9(3):365. https://doi.org/10.3390/children9030365 PMid:35327737 PMCid: PMC8947656
39. Łucka I, Janikowska-Hołoweńko D, Domarecki P, Plenikowska-Ślusarz T, Domarecka M. Orthorexia nervosa-a separate clinical entity, a part of eating disorder spectrum or another manifestation of obsessive-compulsive disorder. Psychiatr Pol. 2019;53(2):371-82. https://doi.org/10.12740/PP/OnlineFirst/85729 PMid:31317964
40. Ramacciotti CE, Perrone P, Coli E, et al. Orthorexia nervosa in the general population: A preliminary screening using a self-administered questionnaire (ORTO-15). Eat Weight Disord. 2011;16(2):e127-30. https://doi.org/10.1007/BF03325318 PMid:21989097
41. Asil E, Yılmaz M, Ayyıldız F, Yalçın T. The effect of social media use on orthorexia nervosa: A sample from Turkey. Nutr Hosp. 2023;40(2):384-90. https://doi.org/10.20960/nh.04217
42. Sanlier N, Navruz Varli S, Macit MS, Mortas H, Tatar T. Evaluation of disordered eating tendencies in young adults. Eat Weight Disord. 2017;22(4):623-31. https://doi.org/10.1007/s40519-017-0430-9 PMid:28871480
43. Gonidakis F, Lemonoudi M, Charila D, Varsou E. A study on the interplay between emerging adulthood and eating disorder symptomatology in young adults. Eat Weight Disord. 2018;23(6):797-805. https://doi.org/10.1007/s40519-018-0552-8 PMid:30066259
44. Fidan T, Ertekin V, Işikay S, Kırpınar I. Prevalence of orthorexia among medical students in Erzurum, Turkey. Compr Psychiatry. 2010;51(1):49-54. https://doi.org/10.1016/j.comppsych.2009.03.001 PMid:19932826
45. Kinzl JF, Hauer K, Traweger C, Kiefer I. Orthorexia nervosa in dieticians. Psychother Psychosom. 2006;75(6):395-6. https://doi.org/10.1159/000095447 PMid:17053342
46. Barnes MA, Caltabiano ML. The interrelationship between orthorexia nervosa, perfectionism, body image and attachment style. Eat Weight Disord. 2017;22(1):177-84. https://doi.org/10.1007/s40519-016-0280-x PMid:27068175
47. Quittkat HL, Hartmann AS, Düsing 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. https://doi.org/10.3389/fpsyt.2019.00864 PMid:31920737 PMCid:PMC6928134
48. Runfola CD, Von Holle A, Trace SE, et al. Body dissatisfaction in women across the lifespan: Results of the UNC-SELF and gender and body image (GABI) studies. Eur Eat Disord Rev. 2013;21(1):52-9. https://doi.org/10.1002/erv.2201 PMid:22949165 PMCid:PMC3745223
49. Esnaola I, Rodríguez A, Goñi A. Body dissatisfaction and perceived sociocultural pressures: Gender and age differences. Salud Ment. 2010;33(1):21-9.
50. Tiggemann M. Body image across the adult life span: Stability and change. Body Image. 2004;1(1):29-41. https://doi.org/10.1016/S1740-1445(03)00002-0 PMid: 18089139
51. Rosenqvist E, Konttinen H, Berg N, Kiviruusu O. Development of body dissatisfaction in women and men at different educational levels during the life course. Int J Behav Med. 2023;31(5):718-29. https://doi.org/10.1007/s12529-023-10213-x PMid:37592079 PMCid:PMC11452481
52. Schwartz MB, Brownell KD. Obesity and body image. Body Image. 2004;1(1):43-56. https://doi.org/10.1016/S1740-1445(03)00007-X PMid:18089140
53. Weinberger N-A, Kersting A, Riedel-Heller SG, Luck-Sikorski C. Body dissatisfaction in individuals with obesity compared to normal-weight individuals: A systematic review and meta-analysis. Obes Facts. 2017;9(6):424-41. https://doi.org/10.1159/000454837 PMid:28013298 PMCid: PMC5644896
54. Spearing M. Eating disorders: Facts about eating disorders and the search for solutions. ERIC; 2001. Available at: https://eric.ed.gov/?id=ED457455 (Accessed: 27 March 2025).
55. van Furth EF, van der Meer A, Cowan K. Top 10 research priorities for eating disorders. Lancet Psychiatry. 2016; 3(8):706-7. https://doi.org/10.1016/S2215-0366(16)30147-X PMid:27475763

56. Tuan Abd Aziz TNAS, Shukri M. Relationship between body dissatisfaction and eating disorder of university students. Univ Malaysia Terengganu J Undergrad Res. 2019;1(2):36-40. https://doi.org/10.46754/umtjur.v1i2.64
57. Vohs KD, Voelz ZR, Pettit JW, et al. Perfectionism, body dissatisfaction, and self-esteem: An interactive model of bulimic symptom development. J Soc Clin Psychol. 2001; 20(4):476-97. https://doi.org/10.1521/jscp.20.4.476.22397
58. Grabe S, Ward LM, Hyde JS. The role of the media in body image concerns among women: A meta-analysis of experimental and correlational studies. Psychol Bull. 2008;134(3):460-76. https://doi.org/10.1037/0033-2909.134.3.460 PMid:18444705
59. Goldfield GS, Moore C, Henderson K, Buchholz A, Obeid N, Flament MF. Body dissatisfaction, dietary restraint, depression, and weight status in adolescents. J Sch Health. 2010;80(4):186-92. https://doi.org/10.1111/j.1746-1561.2009.00485.x PMid:20433644
60. Yuan ASV. Gender differences in the relationship of puberty with adolescents' depressive symptoms: Do body perceptions matter? Sex Roles. 2007;57(1-2):69-80. https://doi.org/10.1007/s11199-007-9212-6
61. Yang F, Qi L, Liu S, et al. Body dissatisfaction and disordered eating behaviors: The mediation role of smartphone addiction and depression. Nutrients. 2022;14(6):1281. https://doi.org/10.3390/nu14061281 PMid:35334936 PMCid:PMC8955505
62. Hussenoeder FS, Conrad I, Engel C, et al. Analyzing the link between anxiety and eating behavior as a potential pathway to eating-related health outcomes. Sci Rep. 2021; 11(1):14717. https://doi.org/10.1038/s41598-021-94279-1 PMid:34282257 PMCid:PMC8289991
63. Perez MB, Hayes TB, Frazier LD. Beyond generalized anxiety: The association of anxiety sensitivity with disordered eating. J Eat Disord. 2023;11(1):173. https://doi.org/10.1186/s40337-023-00890-0 PMid: 37784155 PMCid:PMC10544544
64. Kirmizi M, Yalcinkaya G, Sengul YS. Gender differences in health anxiety and musculoskeletal symptoms during the COVID-19 pandemic. J Back Musculoskelet Rehabil. 2021;34(2):161-7. https://doi.org/10.3233/BMR-200301 PMid:33682695
65. Faravelli C, Scarpato MA, Castellini G, Sauro CL. Gender differences in depression and anxiety: The role of age. Psychiatry Res. 2013;210(3):1301-3. https://doi.org/10.1016/j.psychres.2013.09.027 PMid:24135551
66. Canlı D, Karaşar B. Health anxiety and emotion regulation during the period of COVID-19 outbreak in Turkey. Psychiatr Danub. 2020;32(3-4):513-20. https://doi.org/10.24869/psyd.2020.513 PMid:33370761