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Evaluation of exercise addiction and orthorexīa nervosa among individuals attending fitness centers: insights from an adult population study

Gulcan ARUSOGLU[1], Pinar SÖKÜLMEZ KAYA[2], Canan ASAL ULUS[2]

1 Kirklareli University, Faculty of Health, Depart. of Nutrition and Dietetics. Kirklareli, Turkiye.
2 Ondokuz Mayis University, Faculty of Health, Depart. of Nutrition and Dietetics. Samsun, Turkiye.

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ABSTRACT

Aim: This study aimed to determine the emotional eating status and orthorexia nervosa tendencies of 87 individuals aged 18–65 who had been attending fitness centers in the city center of Kirklareli for at least three months, and to examine their association with exercise addiction.

Materials and Methods: Through a structured questionnaire, data on participants' general characteristics, nutritional and physical activity habits, and body mass index (BMI) measurements were collected. The Exercise Addiction Scale (EAS-17) was employed to assess exercise addiction, the ORTO-11 scale to evaluate orthorexia nervosa, and the Emotional Eating Scale (EES) to measure emotional eating behaviors.

Results: The mean age of the participants was 27.07± 8.66 years (Median: 24, Min: 18, Max: 52); 56.3% were male, 74.7% were single, and 65.5% had a high school education or lower. According to the EAS cut-off points, 4.6% were at low risk, 49.6% at risk, 42.5% addicted, and 3.4% highly addicted. A statistically significant difference was observed between waist circumference and the mean scores of the "Excessive Focus" and "Mood Alteration" subscales of EAS (p=0.001). Based on EES cut-off points, 34.5% of the adults were found to be low, 44.8% moderate, and 4.6% very high emotional eaters. No statistically significant relationship was observed between total EAS scores and total or subscale EES scores (p>0.05). Similarly, no statistically significant association was found between total and subscale EAS scores and ORTO-11 total scores (p>0.05).

Discussion: The results of this study demonstrated that, among a substantial proportion of individuals engaged in exercise, no relationship was found between exercise addiction and tendencies toward orthorexia or emotional eating.

Conclusion: It is considered beneficial for future studies to be conducted with larger sample sizes.

KEY WORDS

Physical activity dependence, Orthorexia, Emotional regulation.

INTRODUCTION

Behaviors that are inherently beneficial may lead to numerous adverse consequences when they become obsessive. Although exercise is universally regarded as a healthy habit, it is acknowledged that it has the potential to turn into an obsessive and harmful behavior[1,2]. Regular physical activity plays an important role in maintaining health and preventing disease. However, excessive exercise has the potential to negatively affect both physical and psychological health[3]. Similar to other addictive behaviors, excessive exercise is frequently described by theorists as compulsive[1,4]. Exercise encompasses systematic, programmed, and repetitive physical activities aimed at maintaining or improving one or more components of physical fitness (cardiorespiratory endurance, flexibility, muscular fitness)[5]. Physical activity, on the other hand, is defined as any bodily movement—such as household chores, dancing, running, or walking—produced by skeletal muscle contractions that expend energy above the basal level[5,6].

Correspondencia:
Gulcan Arusoglu
arusoglugulcan@gmail.com

Exercise addiction may also emerge as a compensatory behavior undertaken to support efforts to remain thin, often associated with eating disorders[7]. The physical and psychological benefits of regular exercise are well documented. However, while exercise is enjoyed by many, it may also be performed compulsively, resulting in harm. Despite its many positive effects, an excessive preoccupation with exercising, spending much of one's time exercising, and being unable to control this behavior despite barriers are considered indicators of exercise addiction[8]. Exercise addiction is thus characterized by psychological symptoms such as an overwhelming desire to exercise during leisure time and the inability to control excessive exercise behavior[9].

Although the primary purpose of eating is nutrition, eating attitudes have been rapidly changing under cultural, biological, and psychological influences. Eating disorders, which result from the interaction of these factors, are conditions with both psychological and physical dimensions. They may lead to severe complications and even death due to inadequate or excessive food consumption[10]. Eating disorders are characterized by significant disturbances in eating behavior or behaviors that substantially impair physical and psychosocial health and result in alterations in the consumption and absorption of food[11]. Research on less recognized eating disorders not included in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-V) has been increasing[12]. The most common of these include orthorexia nervosa, bigorexia, diabulimia, and the female athlete triad. Orthorexia nervosa refers to a pathological obsession with consuming healthy foods free of herbicides, pesticides, or artificial substances, in which behaviors are associated more with the quality than the quantity of food consumed[13]. Studies have demonstrated that the prevalence of eating disorders is higher among athletes than in the general population[14,15]. Research has shown that eating disorders occur in 6.0% of non-athletes, 20.0% of athletes engaged in appearance-focused sports, and 10.0% of athletes in sports where appearance is not important[15].

Beyond the aforementioned measurement tools, another instrument used to assess eating is the Emotional Eating Scale, developed by Garaulet et al. in 2012. This short, simple, and comprehensible tool assesses the tendency to overeat in response to negative emotions, a psychological eating behavior that often leads to consuming food in excess of normal needs. Emotional eating is typically associated with affective fluctuations such as depression, anxiety, and loneliness[16].

It cannot be claimed that all bodybuilders training in such facilities or all individuals exercising three times a week are exercise addicts or at risk of eating behavior disorders. However, among individuals who are psychologically predisposed, young people, and those who disrupt their meal balance in pursuit of their goals and desire to exercise more, symptoms of disordered eating and exercise addiction are likely to appear.

The primary aim of this study is to determine the relationship between orthorexia nervosa, defined as an obsession with healthy eating, emotional eating, and exercise addiction among individuals engaged in sports.

MATERIALS AND METHODS

Design and Sample

Ethical approval for this study was obtained from the Kırklareli University Non-Interventional Clinical Research Ethics Committee. The research was conducted with the approval of the Kırklareli University Ethics Committee under protocol number E-69456409-199-13467 PR0334R0. The study population consisted of volunteer individuals aged 18–65 who held active memberships in fitness centers located in the central district of Kırklareli. Written permission was obtained from fitness center managers to conduct the study. Each participant was provided with the necessary explanation prior to the questionnaire, and participation was ensured on a voluntary basis after obtaining informed consent. Individuals who had been attending the fitness center for less than three months, those younger than 18, and those older than 65 were excluded from the study. Based on self-reporting that participants have been enrolled for more than three month were included. This registration period indicates the continuity of the member. The selection of participants is based on volunteering. The scales were self-administered and social desirability was quite high.

The sample of the study was determined using the non-probability random sampling method. The study is an analytical cross-sectional study. Fitness centers located in the district center were selected. Data on participants' sociodemographic characteristics (age, gender, education/employment status) and general information (nutritional habits, physical activity habits, alcohol/smoking status, etc.) were collected through face-to-face interviews using a multiple-choice questionnaire. Voluntary informed consent was obtained from all participants.

The Exercise Addiction Scale-17 (EAS-17), which has been validated and tested for reliability in Turkish, was used to determine exercise addiction. Through the questionnaire, participants' general characteristics, nutritional and physical activity habits, and anthropometric measurements were also obtained. In addition, the ORTO-11 scale was used to assess participants' eating attitudes and behaviors, and the Emotional Eating Scale (EES) was employed to examine emotional eating behavior.

Waist circumference (cm) Normal (female: ≤80 cm, male: ≤94 cm) Risky (female: >80 cm, male: >94 cm) High-risk (female: >88 cm, male: >102 cm)[28].

The scales were checked with weights of 0.5, 1, 5, 10 and 20 kg before each use. The scale was accurate to ±0.1 kg.

The Mesilife MC-210 stadiometer was accurate to ±0.1 cm. Waist circumference measurement was made with a non-stretchable tape measure which was accurate to ±0.1 cm.

BMI (kg/m^2) <18.5 underweight, 18.5–24.9 normal, 25.0–29.9 overweight, ≥30.0 obese. Measurements were taken by the researcher and repeated 3 times[28].

Using the G*Power 3.1.9.4 program, with 80% statistical power and a significance level of α=0.05, the minimum required sample size to detect an effect size of *d*=0.30 for correlation analysis was calculated as 82[17-19]. At the end of the study, 87 individuals were included.

Data Collection Tools

Exercise Addiction Scale-17 (EAS-17)

In the EAS-17 adapted to Turkish by Yeltepe et al., a 3-factor structure was obtained. The scale explains 54.61% of the variance. When the factors were examined, it was determined that the first factor consists of the first 7 items (1, 2, 3, 4, 5, 6, 7) under the name "Excessive Focus and Mood Change." This factor alone explains 34.89% of the exercise dependence variable in the scale. The second factor, "Postponement of Individual-Social Needs and Conflict," was found to consist of 6 items (8, 9, 10, 11, 12, 13). This factor alone explains 13.06% of the exercise dependence variable in the scale. It was determined that the third factor consists of 4 items (14, 15, 16, 17) under the name "Tolerance Development and Passion," and the third factor alone explains 6.65% of the exercise dependence variable in the scale. The score ranges of the Exercise Addiction Scale are evaluated as "1-17 normal group, 18-34 low-risk group, 35-51 risk group, 52-69 addicted group, 70-85 highly addicted group." Necessary usage permissions were obtained from the author who conducted the Turkish adaptation.

In this study, Cronbach's alpha coefficients were calculated as 0.704 for the EAS total dimension, and 0.846, 0.643, 0.653 for the Excessive Focus and Mood Change, Postponement of Individual-Social Needs, Conflict and Tolerance Development and Passion subdimensions, respectively.

Orthorexia Nervosa (Orto-11) Scale

ORTO-15 test, a Likert-type scale, was developed by Donini et al. to determine individuals' obsession with healthy eating. The ORTO-15 test investigates individuals' habits of purchasing, preparing, and selecting foods, as well as their obsessions with foods they consider healthy. In the Turkish version of the scale adapted by Arusoğlu et al., since items with the highest possible statistical power were selected, 11 items were determined in the final version and it was named ORTO-11[20,21]. In this study, the Cronbach's alpha coefficient for ORTO-11 was calculated as 0.591.

Emotional Eating Scale

A 10-item, three-dimensional scale was obtained from the Turkish version published by Arslantaş et al. It consists of a 4-option rating starting with "never" as a response of zero and ending with sometimes, usually, and always responses, with a maximum of 3 points. As the scores obtained increase, emotional eating behavior increases. It has three subdimensions consisting of inability to prevent eating desire, food types, and feeling of guilt. There are no reverse items in the scale. The lowest score is "0" and the highest is 30 points. Garaulet et al. (2012) reported that scoring 0-5 points from the scale indicates "not being an emotional eater," 6-10 points indicates "being a low-level emotional eater," 11-20 points indicates "being an emotional eater," and 21-30 points indicates "being a very emotional eater"[22]. In this study, Cronbach's alpha coefficients were calculated as 0.711 for the EES total dimension, and 0.765, 0.667, and 0.537 for the Inability to Prevent Eating Desire, Food Types, and Feeling of Guilt subdimensions, respectively.

Data analysis

Descriptive tests including number (n), percentage (%), mean (M), standard deviation (±SD), minimum (Min.), maximum (Max.), and median were utilized in data analysis. Reliability Analysis was conducted for the reliability of the scales, and results were evaluated with Cronbach's alpha coefficient. The normality of distribution was investigated with the Kolmogorov-Smirnov test. Student's t-test was applied for parametric distributions and Mann-Whitney U test for nonparametric distributions in comparing two independent group means. Kruskal-Wallis H test was performed for nonparametric distributions in comparing three or more group means, and when the difference was found to be significant, Tamhane's T3 test from post hoc tests was utilized. The relationship between numeric variables was examined with Pearson correlation analysis for parametric distributions and Spearman correlation analysis for nonparametric distributions. Correlation coefficients were evaluated as very weak if ≤0.25, weak if 0.26-0.49, moderate if 0.50-0.69, strong if 0.70-0.89, and very strong if ≥0.90 (19). Analyses were performed in the Statistical Package for the Social Sciences 26.0 (SPSS 26.0), and $p<0.05$ was considered significant. Homogeneity of variances was verified before applying t-tests.

RESULTS

Table 1 presents the distribution of participants' descriptive characteristics and the comparison of these characteristics according to the Exercise Addicted Scale (EAS) total and subdimension scores. It was determined that 56.3% of the adults with a mean age of 27.07±8.66 years (Median: 24, Min.: 18, Max.: 52) were male, 74.7% were single, and 65.5% had high school education or below.

Table 1. Distribution of participants' descriptive characteristics and comparison of these characteristics according to Exercise Addiction Scale (EAS) total and sub-dimension scores

Variables (n=87)	n (%)	Total			Overfocus and Emotional Change			Postponement of Individual-Social Needs and Conflict			Development of Tolerance and Passion		
		x̄±SD	Test value	p	x̄±SD	Test value	p	x̄±SD	Test value	p	x̄±SD	Test value	p
Gender													
Woman	38 (43,7)	49,74±7,88	-1,413[1]	0,161	24,18±6,47	-0,021[2]	0,983	14,58±4,64	-1,425[2]	0,154	10,97±3,42	-2,346[1]	**0,021***
Men	49 (56,3)	52,57±10,23			23,98±7,05			15,76±4,46			12,84±3,86		
Age													
< 25	47 (54,0)	50,91±10,11	-0,451[1]	0,653	23,36±6,33	-1,645[2]	0,100	15,47±4,64	-0,406[2]	0,685	12,09±4,13	0,166[1]	0,869
≥ 25	40 (46,0)	51,83±8,45			24,90±7,24			14,98±4,49			11,95±3,35		
Marital status													
Married	22 (25,3)	50,68±7,99	-0,195[2]	0,845	23,55±7,88	-0,025[2]	0,980	15,59±4,70	-0,269[2]	0,788	11,55±3,96	-0,868[2]	0,385
Single	65 (74,7)	51,55±9,80			24,25±6,40			15,12±4,53			12,18±3,72		
Education status													
Highschool and below	57 (65,5)	50,65±10,17	-0,942[1]	0,349	22,42±7,06	-3,186[2]	**0,001****	15,98±4,62	-2,061[2]	**0,039***	12,25±3,95	0,757[1]	0,451
University and above	30 (34,5)	52,63±7,50			27,20±4,90			13,83±4,14			11,60±3,43		
Smoking status													
No	59 (67,8)	51,22±9,48	-0,123[2]	0,902	23,95±6,76	-0,191[2]	0,848	15,46±4,84	-0,155[2]	0,877	11,81±3,75	-0,757[2]	0,449
Yes	28 (32,2)	51,57±9,20			24,32±6,89			14,79±3,92			12,46±3,83		
Alcohol consumption													
No	52 (59,8)	51,75±8,96	0,505[1]	0,615	23,65±6,71	-0,856	0,392	15,60±4,65	-1,103	0,270	12,50±4,05	1,448[1]	0,151
Yes	35 (40,2)	50,71±9,97			24,69±6,89			14,71±4,42			11,31±3,23		
Chronic disease													
No	80 (92,0)	51,69±9,11	-1,148[2]	0,251	24,24±6,69	-0,783[2]	0,434	15,31±4,59	-0,493[2]	0,622	12,14±3,79	-1,034[2]	0,301
Yes	7 (8,0)	47,29±11,67			22,14±7,90			14,43±4,39			10,71±3,50		
Regular medication consumption													
No	83 (95,4)	51,72±9,23	-1,714[2]	0,087	24,30±6,64	-1,353[2]	0,176	15,27±4,56	-0,325[2]	0,745	12,16±3,78	-1,628[2]	0,103
Yes	4 (4,6)	43,25±9,03			19,25±8,54			14,75±4,92			9,25±2,50		
Vitamin/mineral consumption													
No	58 (66,7)	51,47±9,39	-0,050[2]	0,960	24,93±6,16	-1,464[2]	0,143	15,00±4,71	-0,890[2]	0,374	11,53±3,94	-1,768[2]	0,077
Yes	29 (33,3)	51,07±9,39			22,34±7,66			15,72±4,26			13,00±3,24		

[1] Student's t-test. [2] Mann Whitney-U test. * p<0,05, ** p<0,01.

The mean scores for the research group's EAS total, Excessive Focus and Mood Change, Postponement of Individual-Social Needs and Conflict, and Tolerance Development and Passion subdimensions were determined as 51.33±9.34 (Min.: 30, Max.: 76), 24.07±6.76 (Min.: 10, Max.: 35), 15.24±4.55 (Min.: 6, Max.: 25), and 12.02±3.77 (Min.: 4, Max.: 20), respectively. According to EAS cutoff points, it was observed that 4.6% were at low risk, 49.6% were at risk, 42.5% were dependent, and 3.4% were highly dependent (not shown in table).

No statistically significant difference was found between the group's descriptive characteristics and EAS total dimension scores (p>0.05). The mean score for the Tolerance Development and Passion subdimension was found to be statistically significantly higher in males compared to females (p=0.021). While the mean score for the Excessive Focus and Mood Change subdimension was statistically significantly higher in those with university education or above compared to those with high school education or below (p=0.001), the mean score for the Postponement of Individual-Social Needs and Conflict subdimension was determined to be lower (p=0.039) (Table 1).

Table 2 presents the distribution of participants' nutritional status-related characteristics and their comparison according to EAS total and subdimension scores. It was determined that 47.1% of the research group consumed three main meals, 6.9% consumed three snacks, and 64.4% consumed adequate amounts of water. It was found that 19.5% of the group used nutritional supplements, with whey protein (82.4%), creatine (23.5%), and multivitamins (23.5%) being the most commonly used among users (not shown in table). It was determined that 8.0% of adults consumed sports drinks, and the mean EAS total dimension score of sports drink consumers was statistically significantly higher compared to non-consumers (p=0.048). According to BMI classification, 35.6% of participants were overweight and 6.9% were obese; according to waist circumference classification, 9.1% were in the risky group and 37.9% were in the high-risk group. A statistically significant difference was found between waist circumference and the mean score of the EAS Excessive Focus and Mood Change subdimension (p=0.001). When examining the source of the difference, those with normal waist circumference had statistically significantly higher mean scores for the Excessive Focus and Mood Change subdimension compared to those at high risk (p=0.001). No statistically significant difference was found between the group's nutritional status-related characteristics and the EAS Postponement of Individual-Social Needs and Conflict and Tolerance Development and Passion subdimension scores (p>0.05).

Table 3 shows the distribution of participants' physical activity-related characteristics and their comparison according to EAS total and subdimension scores. It was found that 25.3% of adults were active as athletes, with fitness (39.1%), bodybuilding (10.3%), and football (5.7%) being the most practiced sports among these types (not shown in table). Participants who were active as athletes had statistically significantly higher mean scores for the Tolerance Development and Passion subdimension compared to those who were not (p=0.014). It was determined that 61.2% of participants had been doing sports for less than 3 years, 52.9% trained less than 5 times per week, and 65.5% trained less than 2 hours per day. It was observed that 70.1% of adults paid attention to fluid consumption before and after training; those who paid attention to fluid consumption had statistically significantly higher mean scores for EDS total score (p=0.024) and Excessive Focus and Mood Change subdimension score (p=0.001). It was found that 63.2% of the research group paid attention to nutrition before and after training; those who paid attention to fluid consumption had statistically significantly higher mean scores for the Excessive Focus and Mood Change subdimension (p=0.001).

It was determined that 31.0% of the group ate after training; among the foods consumed after training, chicken (30%), fruits (25.0%), rice, pasta, etc. (23.3%), red meat products (20.0%), and protein powder (16.7%) were the most common (not shown in table). Those who ate after training had statistically significantly higher mean scores for the Postponement of Individual-Social Needs and Conflict subdimension compared to those who did not (p=0.046) (Table 3).

Table 4 presents the relationship between participants' Exercise Dependence Scale total and subdimension scores and the Emotional Eating Scale (EES) and Orthorexia Nervosa Scale-11 (ORTHO-11) total and/or subdimension scores. According to EES cutoff points in the research group, it was found that 34.5% of adults were low-level, 44.8% were moderate-level, and 4.6% were very high-level emotional eaters (not shown in table). A weak negative statistically significant relationship was found between the EAS Excessive Focus and Mood Change subdimension score and EES total (r: -0.333, p=0.002) and Inability to Prevent Eating Desire subdimension score (r: -0.394, p=0.000). A weak or very weak positive statistically significant relationship was determined between the EDS Postponement of Individual-Social Needs and Conflict subdimension score and EES total (r: 0.263, p=0.014), Inability to Prevent Eating Desire (r: 0.334, p=0.002), and Feeling of Guilt (r: 0.216, p=0.045) subdimension scores. No statistically significant relationship was observed between EAS total dimension and Tolerance Development and Passion subdimension scores and EES total and subdimension scores (p>0.05). No statistically significant relationship was found between EDS total dimension and subdimension scores and ORTHO-11 total dimension scores (p>0.05).

Table 2. Distribution of participants' nutritional status characteristics and comparison of these characteristics according to Exercise Addiction Scale (EDS) total and sub-dimension scores

Variables (n=87)	n (%)	Total			Overfocus and Emotional Change			Postponement of Individual-Social Needs and Conflict			Development of Tolerance and Passion		
		x̄±SD	Test value	p	x̄±SD	Test value	p	x̄±SD	Test value	p	x̄±SD	Test value	p
Number of main meals													
<3	31 (35,6)	50,90±8,71			24,29±6,35			14,68±4,53			11,94±3,90		
3	41 (47,1)	52,15±9,65	0,739[3]	0,691	24,90±6,42	2,405[3]	0,300	15,68±4,95	1,107[3]	0,575	11,56±3,91	3,229[3]	0,199
>3	15 (17,2)	50,00±10,12			21,33±8,17			15,20±3,49			13,47±2,88		
Number of snacks													
0	26 (29,9)	52,65±9,11			25,31±6,35			14,69±3,74			12,65±3,59		
1-2	55 (63,2)	51,49±9,42	1,120[3]	0,290	24,16±6,70	0,612[3]	0,434	15,60±4,91	0,470[3]	0,493	11,73±3,87	1,745[3]	0,187
3	6 (6,9)	44,17±7,49			17,83±6,74			14,33±4,76			12,00±3,95		
Daily water consumption													
Insufficient	31 (35,6)	51,06±11,22	-0,182[1]	0,856	25,32±5,96	-1,027[2]	0,304	14,16±4,20	-1,458[2]	0,145	11,58±4,15	-0,813[1]	0,419
Sufficient	56 (64,4)	51,48±8,22			23,38±7,13			15,84±4,67			12,27±3,55		
Nutritional supplement use status													
No	70 (80,5)	50,37±9,39	-1,730[2]	0,084	23,60±6,73	-1,262[2]	0,207	15,06±4,56	-,811[2]	0,417	11,71±3,75	-1,489[2]	0,136
Yes	17 (19,5)	55,29±8,20			26,00±6,75			16,00±4,60			13,29±3,69		
Sports drink consumption													
No	80 (92,0)	50,84±8,86	-1,976[2]	**0,048***	23,95±6,66	-0,595[2]	0,552	15,00±4,57	-1,847[2]	0,065	11,89±3,79	-1,128[2]	0,259
Yes	7 (8,0)	57,00±13,25			25,43±8,30			18,00±3,56			13,57±3,36		
Effect of nutritional status on performance													
Yes	80 (92,0)	51,68±9,59	-1,562[2]	0,118	24,10±6,99	-0,713[2]	0,476	15,41±4,62	-1,096[2]	0,273	12,16±3,67	-0,807[2]	0,420
No	7 (8,0)	47,43±4,28			23,71±3,55			13,29±3,25			10,43±4,76		
Effect of emotional status on performance													
Yes	74 (85,1)	50,96±9,48	-0,757[2]	0,449	24,08±6,72	-0,108[2]	0,914	14,99±4,54	-1,153[2]	0,249	11,89±3,67	-0,927[2]	0,354
No	13 (14,9)	53,46±8,53			24,00±7,29			16,69±4,50			12,77±4,38		
BMI													
Normal	50 (57,5)	52,18±9,76			25,52±6,09			14,90±4,57			11,76±3,80		
Preobese	31 (35,6)	50,77±8,80	1,943[3]	0,378	21,87±7,69	4,659[3]	0,097	16,06±4,52	2,224[3]	0,329	12,84±3,55	3,403[3]	0,182
Obese	6 (6,9)	47,17±8,42			23,33±4,03			13,83±4,67			10,00±4,15		
Waist circumference													
Normal[a]	35 (53,0)	53,63±9,88			26,29±5,70			14,94±4,76			12,40±3,80		
Risk	6 (9,1)	53,33±6,65	6,102[3]	0,051	26,50±6,89	13,239[3]	**0,001****	15,00±3,22	1,418[3]	0,492	11,83±4,17	0,370[3]	0,831
High risk[b]	25 (37,9)	47,64±8,99			19,16±7,34			16,60±5,17			11,88±3,73		

[1] Student's t-test. [2] Mann Whitney-U test. * p<0,05, ** p<0,01.

Table 3. Distribution of participants' characteristics regarding physical activity and comparison of these characteristics according to Exercise Addiction Scale (EAS) total and sub-dimension scores

Variables (n=87)	n (%)	Total			Overfocus and Emotional Change			Postponement of Individual-Social Needs and Conflict			Development of Tolerance and Passion		
		x̄±SD	Test value	p	x̄±SD	Test value	p	x̄±SD	Test value	p	x̄±SD	Test value	p
Being an athlete													
Yes	22 (25,3)	54,77±11,42	-1,613[2]	0,107	25,32±7,15	-1,039[2]	0,299	15,77±4,26	-0,911[2]	0,362	13,68±3,73	-2,467[2]	**0,014***
No	65 (74,7)	50,17±8,30			23,65±6,63			15,06±4,66			11,46±3,64		
Exercise duration													
< 3 years	41 (61,2)	51,00±9,19	-0,870[2]	0,385	22,90±7,11	-1,357[2]	0,175	16,32±4,91	-1,064[2]	0,287	11,78±3,61	-1,287[2]	0,198
≥ 3 years	26 (38,8)	52,62±9,63			25,15±7,00			14,62±4,25			12,85±3,85		
Number of workouts													
< 5 times/week	46 (52,9)	51,39±9,16	0,061[1]	0,952	23,74±6,75	-0,597[2]	0,550	15,74±4,74	-1,092[2]	0,275	11,91±3,89	-0,287[1]	0,775
≥ 5 times/week	41 (47,1)	51,27±9,64			24,44±6,84			14,68±4,32			12,15±3,68		
Duration of workouts													
< 2 h/day	57 (65,5)	51,68±9,82	0,481[1]	0,632	24,61±6,91	-1,367[2]	0,172	14,98±4,56	-1,102[2]	0,270	12,09±3,84	0,220[1]	0,827
≥ 2 h/day	30 (34,5)	50,67±8,46			23,03±6,47			15,73±4,56			11,90±3,69		
Special diet for training													
No	71 (81,6)	50,99±9,40	-0,022[2]	0,983	24,03±6,90	-0,220[2]	0,826	15,24±4,50	-0,154[2]	0,878	11,72±3,79	-1,695[2]	0,090
Yes	16 (18,4)	52,88±9,21			24,25±6,31			15,25±4,95			13,38±3,48		
Time to eat before training													
< 2 hours	39 (44,8)	51,18±9,71	0,622[3]	0,733	24,46±6,87	0,372[3]	0,830	14,74±3,97	3,555[3]	0,169	11,97±3,70	0,300[3]	0,861
≥ 2 hours	31 (35,6)	50,48±6,60			23,48±6,87			14,74±4,68			12,26±3,36		
Doesn't matter	17 (19,5)	53,24±12,55			24,24±6,64			17,29±5,22			11,71±4,75		
Pay attention to fluid consumption before and after training													
No	26 (29,9)	48,58±8,70	-2,265[2]	**0,024***	20,62±6,47	-3,220[2]	**0,001****	16,65±4,53	-1,926[2]	0,054	11,31±3,60	-1,420[2]	0,156
Yes	61 (70,1)	52,51±9,42			25,54±6,38			14,64±4,46			12,33±3,83		
Paying attention to nutrition before and after training													
No	32 (36,8)	49,06±8,80	-1,751[1]	0,084	21,56±6,93	-2,593[2]	**0,010***	15,75±4,71	-,631[2]	0,528	11,75±4,52	-0,473[1]	0,638
Yes	55 (63,2)	52,65±9,46			25,53±6,28			14,95±4,47			12,18±3,29		
Post-workout nutritional status													
No	60 (69,0)	51,32±9,93	-0,303[2]	0,762	24,65±6,66	-1,123[2]	0,261	14,68±4,66	-1,997[2]	**0,046***	11,98±4,02	-0,387[2]	0,699
Yes	27 (31,0)	51,37±8,03			22,78±6,94			16,48±4,12			12,11±3,21		

[1] Student's t-test. [2] Mann Whitney-U test. * p<0,05, ** p<0,01.

Table 4. Correlation between participants' Exercise Addiction Scale total and sub-dimension scores and Emotional Eating Scale and Orthorexia Nervosa Scale-11 total and/or sub-dimension scores

Dimensions	$\bar{x}$±SD	Min-Max	Exercise Addiction Scale (EAS)							
			Total		Overfocus and Emotional Change		Postponement of Individual-Social Needs and Conflict		Development of Tolerance and Passion	
			r	p	r	p	r	p	r	p
EES										
Total	10,97±5,12	0-24	-0,116[1]	0,284	-0,333[2]	**0,002****	0,263[2]	**0,014***	-0,035[1]	0,748
Inability to Control Food Cravings	6,11±3,94	0-14	-0,149[2]	0,168	-0,394[2]	**0,000*****	0,334[2]	**0,002****	0,004[2]	0,970
Types of Food	2,41±1,67	0-6	-0,019[2]	0,863	0,093[2]	0,393	-0,156[2]	0,149	-0,033[2]	0,764
Feeling of Guilt	2,44±1,33	0-6	0,072[2]	0,508	-0,078[2]	0,471	0,216[2]	**0,045***	0,116[2]	0,284
ORTHO-11										
Total	25,66±4,14	17-35	-0,160[2]	0,138	-0,173[2]	0,108	0,080[2]	0,463	-0,036[2]	0,741

[1] Pearson Correlation Analysis. [2] Spearman Correlation Analysis. r: correlation cofficient. *p<0,05, **p<0,01, ***p<0,001.

DISCUSSION

This study was conducted on a total of 87 individuals, consisting of 38 women and 49 men, to evaluate the behaviors of individuals attending fitness centers regarding exercise addiction, emotional eating, and healthy eating obsession. It was determined that 56.3% of the adults with a mean age of 27.07±8.66 years were male, 74.7% were single, and 65.5% had high school education or below.

According to EAS cutoff points, it was observed that 4.6% of participants were at low risk, 49.6% were at risk, 42.5% were addicted and 3.4% were highly addicted (not shown in table). According to the results of another study conducted by Kuzu et al. (2023), it was revealed that 3.3% of participants were exercise addicted and 77.2% had a risk of exercise addiction. Different results are reported in the literature regarding the prevalence of exercise addiction. This variability in study results may stem from measurement tools, characteristics of the selected sample, or cultural differences.

In our study, no difference was found between women and men in terms of exercise addiction. In some of the other studies conducted, exercise addiction was found to be higher in men, while in others, no difference was found between genders[23]. The association of beauty perception in Turkish society with a muscular body structure in men and with thinness in women may be effective in this matter. In our research, no difference was found between the exercise addiction tendencies of individuals in both the under-25 and over-25 groups. However, in the study conducted by Kuzu and Öztürk, it was found that exercise addiction was higher in individuals between 18-28 years of age. In the literature, it is reported that exercise addiction does not change with age, increases with age, or addiction behavior is more common in young people[1,24].

While no difference was found between exercise addiction in terms of educational status in our study, studies in the literature have shown that individuals who are high school graduates have higher exercise addiction tendencies[25]. In the study conducted by Kuzu and Öztürk, it was found that those with university education had higher exercise addiction tendencies[23].

In this study, it was found that the mean exercise addiction scores of cigarette and alcohol users were high, but there was no difference between users and non-users. In another study, the mean exercise addiction score of cigarette and alcohol users was also found to be high[23].

Although research on disorders that emerge together with exercise addiction is insufficient, estimates suggest that 15-20% of exercise-addicted individuals are addicted on nicotine, alcohol, or illegal drugs. Sussman, Lisha, and Griffiths suggest that up to 25% of people with one addiction have another addiction. Buying addiction has been identified as common among the exercise addicted[4].

It has been reported that orthorexia nervosa tendency is more frequent in individuals who are not satisfied with their physical appearance and exercise more frequently in the gym[26]. The relationship between exercise addiction and

eating disorders has significance for diagnosis and treatment[4].

In our study, the mean orthorexia scale score of participants was found to be 25.66±4.14. In studies conducted, it is reported to be higher in athletes, dietitians, and healthcare workers[23]. In our study, no significant relationship was found regarding the increase in orthorexic tendency as exercise dependence increased. In some studies, a weak to moderate relationship has been found between orthorexia and exercise addiction[23,27]. It is an expected result that individuals combine exercise and diet behaviors to protect themselves from diseases and keep their bodies fit and healthy.

In the study conducted by Arslantaş et al. (2019), emotional eating did not show a statistically significant association in terms of orthorexia tendency. That is, no relationship was found between emotional eating and healthy eating obsession[16]. In our study, a statistically significant association was detected in the subscales between exercise addiction risk and emotional eating tendency.

No statistically significant association was detected between EES and ORTO-11 scale in our study. In our study, according to EES cutoff points, it was found that 34.5% of adults were low-level, 44.8% were moderate-level, and 4.6% were very high-level emotional eaters. A weak negative statistically significant association was found between the EAS Excessive Focus and Mood Change subdimension score and EES total and Inability to Prevent Eating Desire subdimension scores.

LIMITATIONS

The study cannot be generalized to the population. The differences in education, marital status, and age of the individuals participating in the study constitute another limitation. The fact that the city where the study was conducted is a small place may affect the results.

CONCLUSION AND RECOMMENDATIONS

The results of this study did not show a relationship between exercise addiction and orthorexia tendency and emotional eating tendency in a significant portion of individuals who exercise. It is considered beneficial for future studies to be conducted with broader participation.

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