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Investigation of the Relationship Between Muscle Deprivation and Eating Disorder in Fitness Athletes

Fitness Sporcularında Kas Yoksunluğu ile Yeme Bozukluğu Arasındaki İlişkinin Araştırılması

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ABSTRACT

In this study, it was aimed to investigate the relationship between muscle deprivation and eating disorder tendency in the sample of Turkish athletes and to examine them in terms of gender, years of doing sports and number of training.

A total of 276 fitness athletes with an average age of 26.72, determined by the random sampling method based on voluntariness, participated in the questionnaire applied in the study. The data of the research were collected by google form online questionnaire using "Personal Information Form", "Muscle Deprivation Scale" and "Orthorexia-11 Scale". Independent Sample T Test, One-Way ANOVA test and Pearson Correlation test were used to analyze the data determined to be normally distributed.

It was determined that the muscle deprivation scores of the athletes differed according to gender, number of training sessions and years of doing sports ($p<0.05$), if their orthorexic tendencies differed according to gender and number of training sessions ($p<0.05$). In addition, a negative correlation was observed between the muscle deprivation levels of the athletes and their eating disorder scores ($p<0.05$).

Body dissatisfaction appears to be one of the most consistent and robust causal risk factors for eating disorder behaviors. Considering the importance of physical appearance in fitness athletes, it is thought that the desire to build more muscle due to environmental influences is thought to be a factor in increasing muscle deprivation in them, while the desire to have a fit triangle body appearance puts the fitnes under pressure and causes deterioration in their eating behaviors.

Keywords: Addiction to Sports, Body İmage, Exercise, Nutrition Attitude

ÖZ

Bu çalışmada, Türk sporcu örneğinde kas yoksunluğu ile yeme bozukluğu eğilimi arasındaki ilişkinin araştırılması ve cinsiyet, spor yapma yılı ve antrenman sayısı değişkenleri açısından incelenmesi amaçlanmıştır.

Araştırmada uygulanan anket formunu, gönüllülük esasına dayalı tesadüfi örnekleme yöntemi ile belirlenen yaş ortalaması 26,72 olan toplamda 276 fitness sporcusu online ortamda doldurdu. Araştırmanın verileri, "Kişisel Bilgi Formu", "Kas Yoksunluğu Ölçeği" ve "Ortoreksiya-11 Ölçeği" kullanılarak toplandı. Anket formu, google form çevrim içi anket yolu ile katılımcılara gönderildi. Verilerin normal dağıldığı belirlendi ve analizlerde Independet Sample T-Testi, One-Way Anova testi ve Pearson Korelasyon testi kullanıldı.

Sporcuların, kas yoksunluğu puanlarının cinsiyet, antrenman sayısı ve spor yapma yılına göre farklılık gösterdiği ($p<0,05$), ortorektik eğilimlerinin ise cinsiyete ve antrenman sayısına göre ise farklılık gösterdiği belirlendi ($p<0,05$). Ayrıca sporcuların kas yoksunluğu düzeyleri ile yeme bozukluğu puanları arasında negatif bir ilişki olduğu görüldü ($p<0,05$).

Vücut memnuniyetsizliği, yeme bozukluğu davranışlarının en tutarlı ve sağlam nedensel risk faktörlerinden biri olduğu görülmektedir. Fitness yapan sporcularda fiziksel görünümün önemi düşünüldüğünde, çevresel etkilerden dolayı daha fazla kas yapma arzusunun, onlarda kas yoksunluğunun artmasına etken olduğu düşünülürken, fit bir üçgen vücut görünümüne sahip olma isteğinin de fitnesçıları baskı altında bırakarak yeme davranışlarında bozulmalara sebebiyet verdiği düşünülmektedir.

Anahtar Kelimeler: Spora Bağımlılık, Beslenme Tutumu, Egzersiz, Vücut İmajı

The study was approved by the Recep Tayyip Erdogan University Social and Human Sciences Ethics Committee (number: 2022/261, Date: 25/11/2022).

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INTRODUCTION

Since each sport requires a unique physical fitness, athletes must meet many needs and expectations such as ideal body, nutritional preferences, trainer nutrition plans and weight attitudes. Body dissatisfaction also occurs when there is a mismatch between the individual's own body image and the body he or she perceives as ideal. This dissatisfaction brings with it the urge for weakness, irregular eating habits and clinical eating disorders.

It is stated that those who experience muscle deprivation symptoms do not leave the house for a few days because they feel bad about their body shape and do not want to be seen by others, and they often have trouble or intense anxiety about revealing (exhibiting) the body. This type of bodily exposure is usually associated with distress or intense anxiety.[1] De Bruin et al., by distinguishing between the 'sportive' body and the 'social' body of the athlete, suggested that an athlete may be satisfied with his body shape and figure in the social environment, but may not be satisfied with his body in the sports environment.[2]

It is suggested that the eating habits of the athletes in sports are shaped by the pressure of the coach in order to achieve an ideal physical attractiveness associated with optimal sports performance, to achieve sportive success or to maximize athletic performance.[3-5]

In studies with athletes, Smolak et al. reported a higher prevalence of eating disorders in elite athletes compared to those who do recreational sports[6], while Martinsen and Sundgot-Borgen reported that female elite athletes had more disordered eating habits compared to sedentary women[4]. Although body image disorders and related eating disorders were initially perceived as a problem for women, increasing research on male body image, starting from the early 1990s and increasing the popularity of bodybuilding, indicates that young men are dissatisfied with their appearance.[7, 8]

Rosendahl et al. show that participation in sports can be protective against the occurrence of eating disorders, while the majority of the literature shows that the prevalence of eating disorders is higher in athletes than in non-athletes[9]. In this context, it is thought that the increase in behaviors such as body dissatisfaction, irregular eating habits or irregular weight control seen in athletes increases the risk of eating disorder. Eating disorders seen in athletes lead to behaviors related to obsessive food selection, long-term fasting, overeating, vomiting, use of weight loss drugs, use of laxatives and diuretics, and excessive exercise. All these actions negatively affect health, interpersonal relationships, mental health, nutrition, academic success, work efficiency, quality of life and social relationships. [7,8]

In line with all this information, it is important to investigate the risk of muscle deprivation and eating disorders, which may adversely affect their psychology and health, in fitness sports where body appearance is very important, in order to determine whether the athletes are at risk or not and to reveal the current situation. In the literature, it has been observed that the focus is on the pathology of eating disorders in sample groups that include adult athletes or adolescents. In addition, studies examining the symptoms of muscle wasting or muscle dysmorphia are limited in number. In our study, unlike existing studies, examining the relationship between muscle deprivation levels and eating disorder tendencies of fitness athletes of different genders and different age groups makes our study important in terms of providing a source for the literature. In addition, the comprehensive determination of muscle deprivation and eating disorder tendencies in the selected sample is important in terms of guiding athletes and coaches in reducing serious problems that may occur on health and performance.

The main purpose of this study is to investigate the relationship between muscle deprivation and eating disorder tendency in a

sample of Turkish athletes. In addition, in our study, it was aimed to examine the symptoms of muscle deprivation and eating disorder in terms of gender, years of doing sports and number of training. In our study, the following hypotheses will be tested.

Hypothesis 1: Is there a significant relationship between muscle deprivation and eating disorder?

Hypothesis 2: Gender, number of training and year of sport make a difference on muscle deprivation of athletes.

Hypothesis 3: Gender, training number and year of sport make a difference on the eating disorder of the athletes.

MATERIAL AND METHOD

This research includes the athletes who agree to fill out the questionnaire form voluntarily, between the ages of 18-35, who do active sports and who do not have any health problems. In the study, the survey model, one of the quantitative research methods used in the field of social sciences, was used and a survey study was conducted as a data collection technique.

Participants

A total of 276 fitness athletes with an average age of 26.72±7.23 and an average body mass index of 23.91±2.80, determined by the random sampling method based on voluntariness, filled out the questionnaire applied in the study online. As a result of the power analysis applied on the basis of previous studies[4] in determining the number of samples, it was determined that 228 participants were sufficient. Participants who did not meet one of the following criteria were not included in the study:

a) 18 to 30 years old
b) Doing active sports
c) Not having any health problems

Data Collection

The data of the study were collected using the "Personal Information Form", "Muscle Deprivation Scale" and "Orthorexia-11 Scale". The survey form was sent to the participants via Google Form online survey between December 2022 and January 2023. After the athletes were given explanatory information about the importance and purpose of the research, the data were collected only from the athletes who participated voluntarily within two weeks.

Data Collection Tools

Personal Information Form

This form was prepared by the researchers and consists of questions about independent variables such as gender, age, height, weight and number of training within the scope of the purpose of the research. The variables used in this study were determined by reference to previous studies. [10-13]

Muscle Dysmorphia Inventory

Developed by McCreary and Sasse, Muscle Dysmorphia Inventory consists of two sub-dimensions and 15 items: Muscularity-Oriented Body Image Attitudes and Muscle Development Behaviors[14]. The items in the scale are rated on a 6-point Likert type as Always (1) and Never (6). Although the scale items are scored inversely, there are no negative statements in the items. Since high scores from the scale will indicate high muscle deprivation, it is recommended that scoring should be done with reverse coding.[15] Since the factor load of the 10th item in the scale is low, the researchers suggest that it should not be included in the scoring. For those who want to add this item to the scoring, they suggested that it should be evaluated within the Muscle Building Behaviors sub-dimension.[14] The adaptation of the muscle deprivation scale to Turkish and its validity-reliability study were carried out by Yıldız.[16] While the Turkish form of the scale was graded in the same way, item 10 was not included in the scale. The Cronbach alpha coefficient of the scale was calculated as 0.89. The sub-dimensions of the scale; are called Muscle-Oriented

Body Image Attitudes and Muscle Building Behaviors.

The muscle deprivation of the participants can be evaluated according to the total score as well as sub-dimensions with the MDI. The Cronbach's Alpha Coefficient of the answers given by the individuals participating in our study to the MDI was 0.869 for the total score; 0.852 for the muscle-oriented body image sub-dimension; muscle building behavior sub-dimension was determined as 0.796.

Orthorexia-11 Scale (ORTO-11)

Donini et al.[17] the 15-item scale form developed by Arusoğlu et al. (2008) adapted it to Turkish and its validity-reliability study was carried out. In the Turkish version of the scale, only items with a factor load of 0.50 and above were selected and the scale form was composed of 11 items. The Cronbach Alpha coefficient of the 11-item ORTO-11 scale form was determined as 0.62. Sub-dimensions of the scale; are called emotion (includes concerns and feelings about healthy eating), behavior (includes behavior related to food selection), cognition (includes nutritional cognitions).

The questions in the scale are answered in the form of a 4-point likert (always, often, sometimes and never) with the expression of the present tense. While the answers that are the distinguishing criteria for orthorexia are evaluated as "1" and the answers showing a tendency to normal eating behavior are evaluated as "4" points, a minimum of 15 points and a maximum of 60 points can be obtained in total. Arusoglu et al.[18] those who scored ≤40 on the ORTO-11 scale were considered orthorexic, and those who scored >40 were considered normal. With the ORTO-11 scale, the eating disorder tendencies of the participants can be evaluated according to the total score as well as sub-dimensions. The Cronbach's Alpha Coefficient of the answers of the athletes participating in our study to the ORTO-11 scale was determined as 0.721.

Analysis of Data

The number of samples to be included in the study was determined using the G-Power program, and statistical analyzes were performed using the IBM SPSS 26.0 statistical program. With the Shapiro Wilk normality test, it was determined that the data complied with the normal distribution assumption (±1.5). While the Independet Sample T-Test was used to examine muscle deprivation levels in terms of gender and number of training variables, the One-Way Anova test was used for the variable of years of doing sports. Tukey test was used as the second level analysis to determine which groups caused the difference after the Anova test. In addition, Pearson Correlation test was used to determine whether there is a relationship between muscle deprivation and eating disorder levels. All results were evaluated at the 0.05 significance level.

Ethical Aspect of Research

The study was approved by the Recep Tayyip Erdogan University Social and Human Sciences Ethics Committee (number: 2022/261, Date: 25/11/2022).

RESULTS AND DISCUSSION

Table 1 shows the distribution of the participants by demographic variables. Table 1 shows that 23.2% of the athletes are female, 76.8% are male, 36.2% are 1-3 years, 18.8% are 4-6 years, 44.9% are 7-9 years of sports history, 46.7% of them did fitness for 1-3 days, 53.3% did 4-6 days, 71.7% did not diet, 28.3% diet was determined (Table 1).

Table 1. Distribution of the Demographic Information of the Athletes

Variable	Group	n	%
Gender	Female	64	23.2
	Male	212	76.8
Sports Year	1-3 years	100	36.2
	4-6 years	52	18.8
	7-9 years	124	44.9
Number of Trainings (Week/Day)	1-3 days	129	46.7
	4-6 days	147	53.3
Dieting Status	Yes	78	28.3
	No	198	71.7

***n: Number of people, %: percentage*

In Table 2, T-Test was applied for two independent groups at a = 0.05 significance level to determine whether there was a significant difference in the total muscle deprivation score and sub-dimension scores in terms of gender and training number of the athletes. In the test results;

Total score in terms of gender ($t_{(274)}$ =4.149; p=0.000), muscle-oriented body image attitudes ($t_{(274)}$ =4.526; p=0.000) and muscle-building behaviors ($t_{(274)}$ =2.375; p=0.018) significant difference was detected. It was seen that the mean of women in total score and sub-dimensions was significantly higher than the mean of men. Total score in terms of number of workouts ($t_{(274)}$ =8.265; p=0.000), muscle-oriented body image attitudes ($t_{(274)}$ =4.617; p=0.000) and muscle-building behaviors ($t_{(274)}$ =10.656; p=0.018) significant difference was detected. It was observed that the averages of those who did sports for 1-3 days in total scores and sub-dimensions were significantly higher than the averages of those who did sports for 4-6 days.

In order to determine whether there is a significant difference in the muscle deprivation total score and sub-dimension scores of the athletes in terms of the years of doing sports in Table 2, the One-Way Anova test at a = 0.05 significance level was applied. In the test results;

Total score in terms of years of doing sports ($F_{(2,273)}$ =6.322; p=0.002), muscle-oriented body image attitudes ($F_{(2.273)}$ =6.492; p=0.002) and muscle-building behaviors ($F_{(2.273)}$ =3.217; p= 0.042) significant difference was detected. In all scores, the average of those with 7-9 years of sports history was higher than the average of those with 1-3 years of sports history.

When the effect sizes were examined, it was determined that gender and number of training had a high effect on muscle deprivation, and the year of doing sports had a low effect.

Table 2. Muscle Deprivation Total Score and Sub-Dimension Levels in Terms of Variables

Sub-Dimensions		**N**	**X**	**STD**	**DF**	**t**	**p**	**d**
Gender								
Muscle Deprivation Total Score	Female	64	54.50	13.45	74	0.149	**0.000***	0.608
	Male	212	45.85	14.95				
Muscle Oriented Body Image Attitudes	Female	64	3.81	1.07	74	0.526	**0.000***	0.671
	Male	212	3.04	1.22				
Muscle Building Behaviors	Female	64	4.01	1.16	74	0.375	**0.018***	0.345
	Male	212	3.59	1.27				
Number of Trainings (Week/Day)								
Muscle Deprivation Total Score	1-3 days	129	55.02	13.11	74	0.265	**0.000***	0.999
	4-6 days	147	41.57	13.80				
Muscle Oriented Body Image Attitudes	1-3 days	129	3.57	1.18	74	0.617	**0.000***	0.556
	4-6 days	147	2.91	1.19				
Muscle Building Behaviors	1-3 days	129	4.41	1.01	74	0.656	**0.000***	1.287
	4-6 days	147	3.05	1.10				
Sub-Dimensions		**N**	**X**	**STD**	**DF**	**F**	**p**	**η^2**
Sports Year								
Muscle Deprivation Total Score	1-3 years	100	43.84	16.01	273	0.322	**0.002* 3>1**	0.044
	4-6 years	52	48.38	15.38				
	7-9 years	124	50.87	13.38				
Muscle Oriented Body Image Attitudes	1-3 years	100	2.91	1.27	273	0.492	**0.002* 3>1**	0.045
	4-6 years	52	3.18	1.34				
	7-9 years	124	3.49	1.08				
Muscle Building Behaviors	1-3 years	100	3.43	1.25	273	0.217	**0.042* 3>1**	0.023
	4-6 years	52	3.83	1.22				
	7-9 years	124	3.83	1.26				

****n:** Number of people, **x̄:** Mean, **STD:** Standard deviation, **DF:** Degree of freedom, **d:** Cohen d, **η^2:** Eta-kare, **1:** 1-3 years, **3:** 7-9 years

In Table 3, T-Test was applied for two independent groups at a = 0.05 significance level to determine whether there was a significant difference in the total score of eating disorders in terms of gender and training number of the athletes. In the test results;

A significant difference was found in the total score in terms of gender ($t_{(274)}$ =-2.375; p=0.018). It was observed that the mean of men (24.84±5.02) was significantly higher than the mean of women (23.16±4.81). A significant difference was found in the total score in terms of the number of training sessions ($t_{(274)}$ =2.108; p=0.036). It was observed that the mean of those who did sports for 1-3 days (25.12±5.27) was significantly higher than the average of those who did sports for 4-6 days (23.86±4.72).

In Table 3, one-way Anova test at a= 0.05 significance level was used to determine whether there was a significant difference in the total score of eating disorders in terms of years of playing sports. In the test results, there was no significant difference in total score in terms of years of doing sports (p>0.05).

When the effect sizes were examined, it was determined that gender and the number of training had a high effect on the level of orthorexia.

Table 3. Eating Disorder Total Score Levels in Terms of Variables

Variables	N	$\bar{X}$	STD	DF	t	p	d
Gender							
Female	64	23.16	4.81	74	-2.375	0.018*	0.341
Male	212	24.84	5.02				
Number of Trainings (Week/Day)							
1-3 days	129	25.12	5.27	74	2.108	0.036*	0.251
4-6 days	147	23.86	4.72				
Variables	**N**	**X**	**STD**	**DF**	**F**	**p**	**η^2**
Sports Year							
1-3 years	100	24.30	4.98				
4-6 years	52	24.85	5.23	273	0.211	0.810	-
7-9 years	124	24.40	4.98				

**p<0,05, **n: Number of people, $\bar{X}$: Mean, STD: Standard deviation, Df: Degree of freedom, d: Cohen d, η^2: Eta-kare.*

In Table 4, Pearson correlation test was applied to determine whether there is a significant relationship between the eating disorder and muscle deprivation levels of the athletes. In the test results, there was a positive relationship between eating disorder and muscle deprivation total score (r = 0.153; p = 0.011), positive relationship between muscle-oriented body image attitudes (r = 0.119; p = 0.048), and muscle-building behaviors (r = 0.150; p=0.012) was found to be a relationship.

Table 4. Relationship Levels Between Muscle Deprivation and Eating Disorder Behavior

		Muscle Deprivation Total Score	Muscle Oriented Body Image Attitudes	Muscle Building Behavior
Eating Disorder Total Score	r	.153*	.119*	.150*
	p	0.011	0.048	0.012

**p<0,05*

It was determined that the muscle deprivation scores of the athletes differed according to gender, number of training sessions and years of doing sports (Table 2). Men, those who train 1-3 days a week, and those with more sports backgrounds were found to have higher muscle deprivation. It is thought that there is a difference in muscle deprivation scores due to the fact that the body images loaded against the female and male bodies (men do fitness to look more muscular, while women do fitness to have a thin appearance) are different. Individuals with a low number of trainings may feel that the training is insufficient to build muscle, and therefore it can be thought that there is a difference in muscle deprivation scores. It is thought that there is a difference in muscle deprivation scores due to the fact that those with a long sports background want to build

as much muscle as possible from the past and protect their muscular bodies. In different studies, it was seen that muscle deprivation was identified with men.[19-21] It has been stated that individuals with muscle deprivation feel weaker and weaker than they actually are, and they want to train more often to overcome this. [19-24]

Orthorexic (eating disorder) tendencies of athletes; It was determined that it did not differ according to the year of doing sports, but differed according to the gender and the number of training (Table 3). It was observed that women and those who exercised more had higher orthorexic tendencies. It is thought that the reason why women have more orthorexic tendencies is because they are more inactive than men and they are more obsessed with weight. It is thought that those who have more training are more obsessed with nutrition in order to be more fit. It is stated in studies that the prevalence of eating disorders is frequently encountered in athletes. [3, 4, 25-27]

It was determined that as the orthorexic tendencies of the athletes decreased (the decrease in the eating disorder scores means that the orthorexic tendency was higher), the muscle deprivation levels increased (Table 4). For this reason, it can be said that the increase in the level of muscle deprivation in order to achieve physical attractiveness of people who do fitness affects their eating behaviors. Studies have also shown that there is a strong relationship between increased body dissatisfaction and eating disorders. [28-31]

CONCLUSIONS AND SUGGESTIONS

As a result, it was determined that the levels of muscle deprivation and orthorexic tendency differed according to the variables, the differences in muscle deprivation were caused by gender, number of training sessions and the year of doing sports, and the differences in orthorexic tendencies were due to gender and the number of training sessions. In addition, it was determined that the athletes with a high orthorexic tendency (≤40) had high muscle deprivation. Accordingly, body dissatisfaction appears to be one of the most consistent and robust causal risk factors for eating disorder behaviors. Considering the importance of physical appearance in fitness athletes, the desire to build more muscle due to environmental effects may be a factor in increasing muscle deprivation in them. The desire to have a fit triangular body appearance can also put pressure on fitness professionals and cause deterioration in their eating behaviors. For this reason, it is a visible fact that those who do fitness are more obsessed with nutrition. Although they are more obsessed with nutrition, this does not mean that those who do fitness eat healthy. Here, most athletes consume packaged supplements that are more easily accessible, while those who are more obsessed take many substances that can cause death. In this context, it was concluded that sports should be done in a controlled and planned manner, not as a problematic behavior (without causing body dissatisfaction and eating disorders in athletes).

Our research includes fitness athletes aged between 18 and 30, who are active in sports and do not have any health problems, determined by random sampling method based on volunteering. In line with the results of our study, health hazards can be prevented by raising the awareness of trainers working in fitness centers about muscle deprivation and nutrition. It is recommended that individuals at risk among the fitness athletes included in our study should receive support.

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