

Determination of Eating Disorders Level and Risk Factors of University Students Studying Sports Education

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Abstract

Eating disorder has become an increasingly common problem among athletes. This study aims to determine eating disorder levels and risk factors of students studying sports education. This study was carried out on 1773 university students, 1084 (61.1%) of whom are female and 689 (38.9%) male, in the field of sports education in different provinces in Turkey. The information of the participants was collected with an individual information form and an Eating Disorder Examination Questionnaire (EDE-Q). All EDEQ sub-dimension scores and the total score were found to be statistically significantly higher in males than in females ($p < 0.05$) except for the restraint score. It was found that, as BMI (Body Mass Index) value increased, there was a statistically significant increase in all sub-dimensions of EDEQ and EDEQ total score ($p < 0.05$). Eating concern and shape concern scores were found to be statistically higher in those who did not perform physical activities than those who performed physical activities (respectively; $p = 0.030$, $p = 0.004$). An increase in the EDE-Q score indicates an increased risk of eating disorders. It can be said that being a male, having a high BMI, and engaging in strength/power sports increase the risk of eating disorders in individuals who receive sports education.

Keywords: Eating Disorders, EDE-Q, University Students

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INTRODUCTION

Eating disorders (EDs) are characterized by abnormal eating habits and defined as cognitive disorders related to food and body weight or having disturbed eating habits in order to lose weight, maintain low body weight, and disorders in the conception of eating (ADA, 2001; Baysal and Bas, 2008). An eating disorder is a psychiatric disorder that can result in death (Fairburn & Harrison, 2003) and is characterized by medical problems such as loss of bone mineral density, physiological stress, and depression (Bar et al., 2016). According to the (DSM-V), Diagnostic and Statistical Manual of Mental Disorders, Eating disorders can be classified under four main headings as Bulimia Nervosa (BN), Binge Eating Disorder (BED), Anorexia Nervosa (AN), and Other Nutrition Eating Disorders Defined (ADA, 2001; Bar et al., 2016; Sleight et al., 2015).

Eating disorders are frequently seen in the 16-20 age range (Alkan et al., 2017). University students are in risk groups in terms of eating disorders in terms of their age, psycho-social and economic status. It is very important to determine the frequency of ED among university students, to take relevant educational and preventive measures, to provide protection, and to provide treatment if the disease has occurred (Galli et al., 2014; Ulaş et al., 2013). Although eating disorders are seen as 5-20 times higher in women compared to men in the general population, it has become widespread among athletes, and surprisingly, their rate of incidence in male athletes has increased (Deering, 2001; Kristjánsdóttir et al., 2019; Taylor et al., 2006; Unalan et al., 2009).

Compared to the general population, athletes are considered to be more perfectionists. However, it is known that perfectionism is associated with bulimic symptoms. Especially people who want to have high standards regarding their body and constantly make self-criticism have more negative assessments of their body shape, and this situation causes more eating disorders. In male athletes who want to improve their appearance with exercise, there is a relationship between self-esteem and a high eating disorder. Contrary to research on female athletes, little is known about the personal and physiological factors that affect eating disorder attitudes and behaviors in male athletes. However, pressures on body weight and shape in sports circles are considered to be among the reasons (Galli et al., 2014).

In women athletes who care about aesthetics (gymnastics, ballet, dance) and endurance athletes, when the energy loss is higher than the energy intake, this results in low energy availability. The wrong practices include food restriction, laxative/enema/diuretic use, and excessive exercise. This has been reported to be a risk factor for the "Female Athlete Triad", especially in women (Cialdella-Kam, 2014; Ghoch et al., 2013; Márquez & Molinero, 2013).

Some of the short-term effects of eating disorders, especially among those engaged in sports, include dehydration due to malnutrition, and a decrease in max.VO₂ and energy insufficiency. In the long term, it is reported to affect the cardiovascular, endocrine, gastrointestinal, nervous, and skeletal systems, and kidneys (Kanpp et al., 2014). Although there are no specific physical examinations and laboratory findings for the diagnosis of eating disorders, various tests are used for evaluation. Patient and family history, physical examination findings, laboratory tests, psychological tests, and forms of assessment of nutritional habits as well as several

questionnaires developed to evaluate eating disorders are available. EAT-26 (Eating Attitudes Test), EDE-Q (Eating Disorder Examination Questionnaire), and EDI (Eating Disorder Inventory) are some of these surveys (Bar et al., 2016; Darcy et al., 2013). The aim of this research was to determine the levels of eating disorders and risk factors among university students in the field of sports education in different provinces of Turkey.

METHOD

Research Model

In this study, which was carried out to determine the eating disorder levels and risks of university students, instant scanning and relational scanning model from the general scanning model was used, the instant scanning approach is aimed to describe the situation as it is within a certain period of time. The relational screening model was used to determine the relationship or degree between two or more variables (Karasar, 2002).

Universe-Sample

This study was carried out on 1773 university students, 1084 females, and 689 males, in the field of sports education in different provinces in Turkey.

Data Collection Tools

Anthropometric Measurements: After measurements of height and body weight, Body Mass Index (BMI-kg/m²) was calculated and categorized according to the criteria of the World Health Organization (WHO) (Fink & Mikesky, 2018).

Eating Disorder Examination Questionnaire (EDE-Q): The EDE-Q developed by Fairburn and Beglin (1994), and the reliability and validity of the Turkish version which was made by Yücel et al. (2011), were used to determine the level of the eating disorder. The scale consists of 28 questions and 4 subscales (restrictions: 1st to 5th questions, eating concerns: 7th, 9th, 19th, 20th, and 21st questions, body shape concerns: 6th, 8th, 10th, 11th, 23rd, 26th, 27th, weight concerns: 28th, 8th, 12th, 22nd, 24th, and 25th questions). In addition to these subscales, there are 6 questions (13, 14, 15, 16, 17, and 18) to determine the level of "binge eating". As a result of the Turkish validity and reliability study, Cronbach's Alpha value was found to be 0.93. In this study, the reliability coefficient of the scale was calculated as 0.91 for the EDE-Q total score. The reliability coefficients were 0.93, 0.89, 0.87, and 0.87 for the subscales related to restriction, eating, body shape, and weight concerns, respectively.

Ethical Approval

This study was approved by the ethics committee of Erzincan Binali Yıldırım University (Date: 22.06.2016, Meeting no: 04/03) and all participants were provided and signed an informed consent form in accordance with "Helsinki Declaration Principles".

Data Collection

Data were collected via a scale form. A personal information form was used to determine the demographic characteristics of the participants, and the Eating Disorder (EDE-Q) scale was used to determine the levels of eating disorders.

Analysis of Data

Statistical analysis was performed using the IBM SPSS ver. 22 package program (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.). The results for continuous variables were provided as mean \pm standard deviation and median (minimum-maximum) value. For reliability analysis, Cronbach's α was used to assess the scale's internal consistency normality of distribution for continuous variables was evaluated using the Shapiro-Wilks test. When the normality assumption was not provided the Mann-Whitney U test was used to compare the independent continuous variables between two groups and Kruskal Wallis test was used for three or more groups. As a post-hoc test Dunn's test was used for pairwise comparisons after the Kruskal-Wallis test. Multivariate logistic regression analysis was performed to determine possible risk factors of having a high EDE-Q score. The study group includes only athletes, therefore dependent variable was created based on the median value (<0.95 accepted as low and ≥ 0.95 accepted as high). Thus, based on univariate analysis, any variable significantly related to EDE-Q total score was drawn into the analysis. Gender and age were included in the model as biological factors. A p-value of less than or equal to 0.05 was considered to be statistically significant.

RESULTS

Of the 1773 students who participated in the study, 61.1% were female (age: 21.8 ± 2.7) and 38.9% were male (age: 21.6 ± 2.7). As a result of the responses given to the EDE-Q questions, all EDE-Q sub-dimension scores (except restrain) and total scores were found to be significantly higher in males than in females ($p < 0.05$, Table 1).

Table 1. EDE-Q scores of participants by gender

| | Gender | | p* |
|-----------------------|---------------------------------|---------------------------------|--------|
| | Female (n=1084) | Male (n=689) | |
| Restraint | 1.36 \pm 1.42 1.0(0.0-6.2) | 1.47 \pm 1.46 1.0(0.0-6.0) | 0.092 |
| Eating concern | 0.91 \pm 1.11 0.4(0.0-5.8) | 1.03 \pm 1.14 0.6(0.0-4.8) | 0.004* |
| Shape concern | 1.33 \pm 1.26 1.0(0.0-6.0) | 1.61 \pm 1.52 1.1(0.0-6.9) | 0.002* |
| Weight concern | 1.21 \pm 1.22 1.0(0.0-6.0) | 1.43 \pm 1.44 1.0(0.0-6.0) | 0.022* |
| Total score | 1.2 \pm 1.11 0.9(0.0-5.5) | 1.39 \pm 1.25 1.0(0.0-5.2) | 0.013* |

*Mann-Whitney U test was used. Results were presented as mean \pm standard deviation, and median (minimum-maximum) value.

According to the BMI assessment, it was determined that 139 participants (3.3% female, 14.9% male) were classified as underweight (BMI; $<18.5 \text{ kg/m}^2$), 1287 participants (71.1% female, 74.9% male) were classified as normal weight (BMI; $18.5\text{-}24.9 \text{ kg/m}^2$), and 347 participants (25.6% female, 10.2% male) were classified as overweight (BMI; $25.0\text{-}24.9 \text{ kg/m}^2$). It was identified that as BMI (Body Mass Index) value increased, there was a statistically significant increase in all EDE-Q sub-dimensions and EDE-Q total score ($p < 0.05$, Table 2).

Table 2. Participants' EDE-Q scores by BMI categories

| | Body Mass Index | | | p* |
|-----------------------|--|--|--|--------|
| | Underweight (n=139) | Normal weight (n=1287) | Overweight (n=347) | |
| Restraint | 0.82±1.22 ^{b,c} 0.0(0.0-4.8) | 1.36±1.4 ^{a,c} 1.0(0.0-6.2) | 1.81±1.54 ^{a,b} 1.6(0.0-6.0) | <0.001 |
| Eating concern | 0.62±1.01 ^{b,c} 0.0(0.0-4.4) | 0.9±1.08 ^{a,c} 0.4(0.0-5.2) | 1.31±1.25 ^{a,b} 1.0(0.0-5.8) | <0.001 |
| Shape concern | 0.9±1.08 ^{b,c} 0.5(0.0-4.4) | 1.37±1.31 ^{a,c} 1.0(0.0-6.0) | 1.91±1.59 ^{a,b} 1.6(0.0-6.9) | <0.001 |
| Weight concern | 0.92±1.18 ^{b,c} 0.4(0.0-4.6) | 1.24±1.27 ^{a,c} 0.8(0.0-6.0) | 1.67±1.45 ^{a,b} 1.4(0.0-6.0) | <0.001 |
| Total score | 0.82±1.01 ^{b,c} 0.3(0.0-4.1) | 1.22±1.13 ^{a,c} 0.9(0.0-5.3) | 1.67±1.28 ^{a,b} 1.6(0.0-5.5) | <0.001 |

*Kruskal Wallis test was used. Results were presented as mean±standard deviation and median(minimum-maximum) values. Dunn's test was used for pairwise comparisons, superscript refers to statistically significant differences ($p<0.05$) among a: underweight, b: normal weight, and c: overweight groups.

A total of 1323 participants (79.3% female, 67.2% male) were engaged in recreational physical activities on a regular basis, and the mean duration of activities was 3.64 ± 1.52 day/hour and 1.93 ± 0.85 hour/day. Eating concern and shape concern scores were found to be statistically higher in those who did not perform physical activities than those who did (respectively; $p=0.030$, $p=0.004$). The restraint score was higher in those who performed physical activities ($p=0.001$). Weight concern and total scores did not differ according to physical activity status (respectively; $p=0.078$, $p=0.483$, Table 3).

Table 3. EDE-Q scores of participants by their recreational physical activity status

| | Physical Activity | | p* |
|-----------------------|---------------------------|---------------------------|--------|
| | Yes (n=1323) | No (n=450) | |
| Restraint | 1.46±1.45 1.2(0.0-6.0) | 1.24±1.4 0.8(0.0-6.2) | 0.001* |
| Eating concern | 0.92±1.11 0.4(0.0-5.8) | 1.06±1.16 0.6(0.0-5.2) | 0.030* |
| Shape concern | 1.37±1.31 1.0(0.0-6.9) | 1.66±1.53 1.2(0.0-6.0) | 0.004* |
| Weight concern | 1.26±1.28 1.0(0.0-6.0) | 1.42±1.41 1.0(0.0-6.0) | 0.078 |
| Total score | 1.25±1.14 0.9(0.0-5.5) | 1.34±1.25 0.9(0.0-5.5) | 0.483 |

*Mann-Whitney U test was used. Results were presented as mean ± standard deviation, median (minimum-maximum) value.

The distribution of professional athlete (n=896) according to their branches is as team sports (n=421, 47.0%), strength/power sports (n=348, 38.8%), and endurance sports (n = 127, 14.2%). Restraint, eating concern, and total scores differ according to sports branches (respectively; $p<0.001$, $p=0.003$, $p=0.008$). Restraint, eating concerns, and total scores were found to be higher in the group of students interested in strength/power sports compared to the students who were engaged in team sports ($p<0.05$). However, shape concern and weight concern scores were similar according to sports branches (respectively; $p=0.566$, $p=0.084$), (Table 4).

Table 4. EDE-Q scores according to the sports branch of the participants

| | Team Sports | Sports type | | p* |
|-----------------------|--|---------------------------|---|--------|
| | | Endurance Sports | Strength/Power Sports | |
| Restraint | 1.25±1.35 ^c 0.8(0.0-6.0) | 1.6±1.56 1.2(0.0-5.6) | 1.79±1.54 ^a 11.6(0.0-6.0) | <0.001 |
| Eating concern | 0.9±1.12 ^c 0.4(0.0-4.4) | 1.09±1.17 0.6(0.0-5.8) | 1.1±1.16 ^a 0.6(0.0-5.2) | 0.003* |
| Shape concern | 1.37±1.33 1.0(0.0-6.0) | 1.55±1.51 1.1(0.0-6.0) | 1.44±1.33 1.1(0.0-5.8) | 0.566 |
| Weight concern | 1.22±1.26 0.8(0.0-5.8) | 1.49±1.43 1.4(0.0-6.0) | 1.39±1.32 1.0(0.0-5.8) | 0.084 |
| Total score | 1.18±1.12 ^c 0.8(0.0-5.2) | 1.43±1.29 1.1(0.0-5.5) | 1.43±1.19 ^a 1.2(0.0-5.3) | 0.008* |

*Kruskal Wallis test was used. Results were presented as mean ± standard deviation, median(minimum-maximum) value. Dunn's test was used for pairwise comparisons, superscript refers to statistically significant differences ($p < 0.05$) among a: team sports, b: endurance sports, c: strength/power sports groups.

Logistic regression was performed to determine the risk factors of having a high EDE-Q total score. The logistic regression model was statistically significant, $\chi^2(6) = 36.507$, $p < 0.001$. Gender and age were not associated with eating disorders but were not removed from the model because of being biological correction factors. BMI and sport types were significantly related to EDE-Q total score. Being in the normal BMI category makes it 2 times more likely to have a higher EDE-Q compared to being in the underweight group (OR: 2.004; 95% CI: 1.050-3.831). Similarly total score, being in the overweight BMI category makes it 2.3 times more likely to have a higher EDE-Q total score compared to being in the normal group (OR: 2.272; 95% CI: 1.560-3.332). When the EDE-Q score was evaluated according to sports type, the scores of endurance sports and team sports were similar. However, the risk of students who performed strength/power sports having higher EDE-Q scores was 1,5 times more than the students who performed team sports (OR: 1.488; 95% CI: 1.090-2.030), (Table 5).

Table 5. The results of logistic regression analysis for EDE-Q total score

| Factors | Regression coefficient | Standard Error | p-value | OR | 95% CI for OR | |
|--|------------------------|----------------|---------|-------|---------------|-------|
| | | | | | Lower | Upper |
| Gender (Male) | 0.174 | 0.161 | 0.278 | 1.190 | 0.869 | 1.631 |
| Age | 0.030 | 0.027 | 0.266 | 1.030 | 0.978 | 1.085 |
| BMI | | | <0.001 | | | |
| <i>Normal weight vs underweight</i> | 0.696 | 0.330 | 0.035 | 2.004 | 1.050 | 3.831 |
| <i>Overweight vs. normal weight</i> | 0.822 | 0.193 | 0.000 | 2.272 | 1.560 | 3.322 |
| Sports type | | | 0.043 | | | |
| <i>Endurance sports vs. team sports</i> | 0.161 | 0.223 | 0.469 | 1.175 | 0.759 | 1.820 |
| <i>Strength/Power sports vs. team sports</i> | 0.397 | 0.159 | 0.012 | 1.488 | 1.090 | 2.030 |

BMI: Body mass index, OR: odds ratio, CI: confidence interval.

DISCUSSION AND CONCLUSION

In studies conducted on university students, it has been determined that the eating disorder seen in female students is more than in male students (Kugu et al., 2006; Turan et al., 2015). When evaluated in terms of athletes, the prevalence of eating disorders among those who do sports is higher than among those who do not (Galli et al., 2014; Schwarz et al., 2005). Although it is difficult to give clear figures about athletes, the risk of eating disorders in the general population is higher in women (who do or do not do sports) than men (who do or do not do sports), whereas the prevalence of eating disorders is stated as 0-19% in male athletes and 6-45% in female athletes (Bonci et al., 2008; Bratland-Sanda & Sundgot-Borgen, 2013). In males, the eating disorder behavior score was found to be lower (Darcy et al., 2012; Darcy et al., 2013; Lavender et al., 2010) and it was concluded that body dissatisfaction and irregular eating behavior were higher (Chapman & Woodman, 2016; Lavender et al., 2010). In the study, it was determined that male students had significantly high eating concerns, shape concerns, weight concerns, and total score values except for restraint. This result is thought to be influenced by the branch of sports they study and the fact that male students give more importance to their body image and shape for this reason. The fact that the research group is university students receiving sports education is in parallel with the findings regarding the increase in eating disorders, especially in the group of males who do sports, contrary to the general population, in recent years (Deering, 2001; Kristjánsdóttir et al., 2019; Taylor et al., 2006; Ünalán et al. 2009). The findings of McLester et al., (2014) suggesting that female athletes have a low risk of eating disorders among university students support the findings of our study.

According to the BMI assessment, it was determined that those who were in the normal weight category had EDE-Q total scores 2 times higher than those in the underweight category, and those in the overweight BMI category had EDE-Q total scores 2.3 times higher than those in normal weight BMI category. As the BMI value increased, a statistically significant increase in all sub-dimensions of EDE-Q and EDE-Q total score was identified. Individuals with high body weight were also concerned about restraint, eating, body shape, and weight, and this led to a deterioration in eating behavior and an increase in the total EDE-Q score.

A total of 1323 participants (79.3% female, 67.2% male) stated that they exercised regularly, and the average exercise duration was 3.64 ± 1.52 day/hour and 1.93 ± 0.85 hour/day. Eating concern and shape concern scores were found to be statistically higher in those who did not do physical activity than in those who did. Based on this result, it can be thought that students who do not do physical activity are concerned about the effect of lack of activity on body shape. The finding that the restriction score is higher in those who do physical activity suggests that they maintained body weight control by exercise with limitations in nutrition. Weight concerns and total scores do not differ according to physical activity status.

It is advantageous for the athletes participating in the competitions to have low-fat mass and body weight. This situation provides the ground for athletes to develop occupancy problems with food and eating disorders (Joy et al., 2016). This is more common, especially in sports in the weight category and that gives importance to aesthetic appearance. In the study, restraint, eating concern, and total scores were found to be higher in the students interested in

strength/power sports compared to the students doing team sports. However, shape concern and weight concern scores are similar according to sports branches. While the EDE-Q scores of the individuals participating in endurance and team sports were similar, the risk of having high EDE-Q scores of the participants in the strength/power sports was found to be 1.5 times higher than the athletes in team sports. This result, especially a higher EDE-Q score in male students, can be explained by the fact that male students are interested in strength/power sports, where body shape is important. In their study, Sundgot-Borgen and Torstveit (2014) found that the prevalence of subclinical or clinical eating disorders (EDs) in athletes (13.5%) was significantly higher compared to the control group (4.6%; $p < 0.001$). The prevalence of EDs in male athletes was higher in antigravity sports (22%), ball games (5%), and endurance sports (9%). Among female athletes competing in aesthetic sports, the prevalence of EDs was higher (42%), endurance sports (24%), technical sports (17%), and ball games (16%). Similarly, in a study conducted in 2015, 108 elite German athletes and 108 non-elite athletes were compared, and the rates of eating disorders were found to be 17% in aesthetic sports, 2% in ball sports, and 2% in non-athletes (Thiemann et al., 2015). Schaal et al. (2011), in their study which aimed to determine the prevalence of gender-specific eating disorders among different branches, found that the highest prevalence among females was in endurance and aesthetic branches, whereas in males it was in branches in the weight category (i.e. wrestling and boxing).

Conclusion

An eating disorder is a health problem with increasing incidence day by day and is seen more frequently in the younger generation who gives more importance to body image. Diagnosis and treatment of eating disorders require a multidisciplinary approach. Among athletes, especially in some branches where a lean, muscular body image is important, more frequent, nutritional behavior disorders lead the athlete to eating disorders and this situation may adversely affect the health and performance of the athlete. This study is important because it reflects the risky two-way situation - being both a university student and an athlete. As a result of this study, it can be said that having high BMI values and dealing with strength/power sports increase the risk of developing eating disorders.

Especially in universities where sports are taught as a science, it is very important to give importance to nutrition and to inform students through experts in the field of sports nutrition. It is important for the students who receive sports science education to have proper nutrition knowledge and habits to protect both their own health and those they will train in the future.

Conflict of Interest: There is no financial or personal conflict of interest among the authors of the article within the scope of the study.

Contribution Rate Statement of Researchers: Research Design; GE; MF, YKA, Data Collection- GE; MF, YKA, statistical analysis; GE; MF, YKA, Preparation of the article; GE; MF, YKA, HY

Ethical Approval

Name of the Committee: Erzincan University Ethics Committee

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