

# The prevalence of disordered eating attitude and its relation to exercise participation in a sample of physical education students

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**Summary.** *Background:* It has been shown that sport and physical activity in order to obtain an ideal body shape constitute the major risk factors for the development of eating disorders. The aim of this study was to examine the physical activity scores differences among students with disordered eating attitudes and the healthy physical education students. *Methods:* This cross-sectional study was conducted on 210 physical education students, 105 males, and 105 females aged 18 to 25 years old who were selected by systematic random sampling from the physical education school at Tabriz University in Tabriz, Iran in 2013. Eating Attitude Test (EAT-26) was used for assessment of disordered eating attitudes. Physical activity score was calculated using MET questionnaire. In addition, demographic characteristics were examined. *Results:* About 10% of studied subjects had disturbed eating attitudes and the disordered eating attitude, defined as EAT-26  $\geq$  20, was significantly more common among males (15.4%) compared to females (4.8%) ( $P < 0.05$ ). The physical activity scores were  $46.50 \pm 5.99$  and  $45.71 \pm 5.23$  (MET.h/day) for men and women, respectively. In studied subjects, physical activity scores were significantly different when comparing participants with disordered eating attitudes and the healthy group ( $P < 0.001$ ). *Conclusion:* Abnormal-eating attitude is more common among male physical education students than female physical education students in Tabriz, Iran. It seems that compulsive physical activity is related to the disordered eating attitudes.

**Key words:** physical activity, physical education, exercise, eating disorders, eating behaviour

## Introduction

Eating disorders (EDs) are serious mental disorders with significant physical and psychological impairment (1). The characteristics of these disorders are preoccupation with food, body weight, and shape that leads to behavior such as starvation, fasting, binge eating and purging and excessive exercise. These disorders include anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED) and eating disorders otherwise not specified (EDNOS) (2).

Physical activity (PA) and eating behaviors are two aspects of lifestyle that impact cardiometabolic risk and long-term health. Physical exercise enhances the quality of life and is considered a common method for weight loss and/or management(3). Physical inactivity and poor eating behaviors (especially binge eating disorder) are important established predictors of morbidity and mortality, including diabetes, cardiovascular disease, hypertension and hyperlipidemia, and obesity(4).

Several reviews and meta-analyses concluded that in the absence of an EDs, exercise imparts positive im-

improvements in factors associated with ED such as anxiety, depression, stress reactivity, and self-esteem(5). On the other hand, exercise dependence may exacerbate the detrimental impact of an ED on health-related quality of life(6).

Disordered eating behavior has been reported in both developing and developed countries.(7) Raising rates of eating disorders' prevalence in non-Western societies have been related to cultural transition and globalization.(8) The causes of eating disorders are complicated and include biological, psychological, hormonal, and environmental factors.(9) On the other hand, some researchers declared that high levels of exercise are related to eating disorders.(10, 11) Also, due to detrimental effects of overtraining, excessive exercise might lead to health problems, and compulsive exercise has been indicated to be connected to eating disorders, even more than the excessive quantity of exercise(12). Weight loss is one of the major reasons reported by men and women for participating in exercise programs. However, exercise can foster weight and diet concerns in certain susceptible individuals because the initial weight loss that often accompanies regular exercise elicits certain social reinforcers which, in turn, may lead to a heightened interest in physical appearance (13).

Eating disorders are important concerns among college students, especially eating disorders and negative body image is more common among health professionals from nutrition and sports sciences(14). Additionally, Johnson, Powers, and Dick (15) showed that of the male collegiate athletes in their study 9.5% and 38% were at risk for anorexia nervosa or bulimia nervosa, respectively.

However, it is less clear whether that risk for disordered eating is increased by sports participation, since some evidence indicate a protective role;(16) therefore the association between physical activity and eating behavior needs more attention and it is relevant to assess association between physical activity and eating behavior in physical education students, However, few studies have investigated this association and have shown rather inconsistent findings(17-19).

There is evidence that higher education students similar to teenagers show high-risk behaviors leading to eating disorders, body dissatisfaction and purging manners like dieting (20).

We hypothesized that the physical activity levels may differ between ED and non-ED students. Furthermore, we first aimed to describe disordered eating behavior in physical education students and second to compare the physical activity levels in ED and non-ED groups in order to determine the relationship between physical activities and eating behavior. We also believe that identifying the association between physical activities and eating behavior will help clinicians to identify students and individuals who may be at risk of developing of ED.

## Materials and methods

### *Study design and participants*

The participants of this cross-sectional study were recruited from physical education school at Tabriz University in Tabriz, Iran, from June to July 2013. The sample size for the study was calculated by G-Power software, considering the relation of the EAT-26 score and physical activity score as the effect size of interest and 95% confidence, 80% power, a two-tailed test and was calculated to be 210 cases. Only students between the ages of 18 and 25 were selected because this study was to the college students, whose usual age distribution was 18-25. From the total 442 students of four academic years, using systematic random sampling, 221 physical education students were recruited. The final sample included 210 students (105 males) for the current analysis.

The ethics committee of Tabriz University of medical sciences approved this study (Ethical code: 5/4/2357). The students were assured about the confidentiality of personal information. After providing the participants with information about details and goals of the study, all subjects participated voluntarily and signed informed consent.

Main outcome measures of the study were students' demographic characteristics, disordered eating attitudes, anthropometric indices, and MET questionnaire was used to define physical activity levels.

### Assessment procedures

Subjects were asked to complete an extended self-administered questionnaire on demographic charac-

teristics, such as age, sex, educational level, whether they had a specific disease and general health.

For disordered eating attitudes evaluation, an EAT-26 questionnaire was used. EAT-26 is a short version of the EAT-40. It is a valid and self-reported instrument with 26 items for assessment of risk factors for eating disorders. It comprises of 26 questions for which, scoring is done on a 6-point scale from always to never(21). The range of test total score is 0-78. Total score of 20 or more, indicates at risk of eating disorders. We defined  $EAT \geq 20$  as positive to disordered eating attitudes. The EAT-26 Persian version has been validated in several studies(22, 23). In a pilot study on 30 Iranian females, the Persian version was used, and the internal consistency (Cronbach's alpha) and test-retest reliability after 15 days were 0.75 and 0.85 respectively(22). In a study on Brazilian youth, the EAT-26 was validated in both genders, and internal consistency (Cronbach's alpha) was 0.88 for females and 0.85 for males and was found that this tool does not differ for males and females(24).

Physical activity level was asked using a self-reported-based questionnaire (25) and expressed as metabolic equivalent hours/day that included nine different metabolic equivalent levels. The scale ranged from sleep/rest (0.9) to high-intensity physical activities (>6).

Weight was measured to the nearest 0.1 kg using a calibrated electronic balance (Seca 769 scale, capacity: max 200 kg, Germany) in light clothes and without shoes. The scale was calibrated against 100 kg weight at the beginning of each data collection day. Height was measured to the nearest 0.1 cm using a stadiometer (Seca 220 stadiometer, range: 60 - 200 cm, Germany) without shoes and with shoulders in a normal position.

Waist circumference was measured at the mid-point between the lower ribs and the iliac crest. Hip circumference was measured horizontally at the level of the largest lateral extension of the hips or over the buttocks. Waist-to-hip ratio was calculated as waist circumference divided by hip circumference.

All statistical analyses were carried out with SPSS13 (SPSS Inc., Chicago IL). Data for continuous variables were expressed as mean  $\pm$  SD if they distributed normal or median (25-75 percentiles) with non-normal distribution. Categorical variables were shown as frequency (percent). Normality distributions of numeric variables were assessed with Kolmogorov-

Smirnov test. Distribution of EAT-26 scores was not normal; therefore we performed nonparametric tests (Mann-Whitney U test) to test differences and relationships between groups and variables. Physical activity data were normally distributed, so t-test was used to evaluate differences between groups. Chi-square test was applied to compare disordered eating attitudes between males and females. Partial correlation analysis was performed to assess the correlation between the level of physical activity and scores on the EAT-26. A P-value less than 0.05 was regarded as significant.

## Results

The mean age of male and female students was  $21.08 \pm 1.69$ . The demographic and main anthropometric measurements of subjects are presented in Table 1.

In total, 10 % of the participants (n=21) presented disordered eating attitudes (15.2% and 4.8 % in men and women, respectively). In males disordered eating attitudes were significantly more frequent compared to females ( $p=0.01$ ). For the eating attitudes, median, 25th and 75th percentiles of EAT- 26 questionnaire scores were 7, 3 and 13 for study subjects, respectively. Males obtained a

**Table1.** General characteristics of the studied subjects (n = 210)

Variables	Mean $\pm$ SD
Age (years)	21.08 $\pm$ 1.69
Weight (kg)	63.96 $\pm$ 9.70
Height (cm)	170.19 $\pm$ 9.14
BMI (kg/m <sup>2</sup> )	22.03 $\pm$ 2.51
Waist circumference (cm)	75.40 $\pm$ 8.17
Hip (cm)	93.95 $\pm$ 5.96
WHR	0.84 $\pm$ 0.03
Physical activity (MET.H/day)	
Male	47.23 $\pm$ 6.76
Female	46.80 $\pm$ 7.41
Gender (n,%)	
Male	105 (50%)
Female	105 (50%)
EAT-26	Median (25th, 75th percentiles) 7 (3.00, 13.00)

*BMI body mass index, EAT-26 eating attitude test, WHR waists to hip ratio.*

higher score of EAT-26 than females ( $P < 0.001$ ).

The physical activity scores were  $47.23 \pm 6.76$  and  $46.80 \pm 7.41$  (MET.H/day) for men and women, respectively. No gender differences were observed regarding the physical activity scores ( $P = 0.66$ ). In studied subjects, physical activity scores were significantly different between disordered eating attitudes and healthy subjects ( $53.74 \pm 4.49$ ,  $46.27 \pm 6.93$ , respectively) ( $P < 0.001$ ). Physical activity scores were significantly different between disordered eating attitudes and healthy subjects in male ( $P < 0.001$ ) and female ( $P = 0.003$ ) students. We found that students at risk of eating disorders (EAT-26 score of 20 or more) spent a significantly higher mean times on physical activity ( $p = < 0.001$ ).

As it is shown in table 2, partial correlation controlling for gender showed a positive correlation between the level of physical activity and scores on the EAT-26. When examining the correlation between EAT-26 scores and anthropometric indices, we found a positive correlation between weight, BMI, WC, as well as WHR and EAT-26 scores (Table 2).

## Discussion

The purpose of the present study was to examine the association between eating disorders and physical activity level. Consistent with our postulation, higher levels of physical activity were associated with eating disorders and people with ED engage in higher levels of physical activity than healthy controls. We have found that the higher engagement in dieting behaviors is linked to more hours spent exercising. The results of the present study are similar to previous reports that aesthetic sports (such as rhythmic and artistic gymnastics, artistic skating, synchronized swimming, dance, and ballet) increase the risk for eating disorders. Additionally, previous studies have found a high preva-

lence (12–23%) of eating disorders among participants of these activities.(26, 27) Moreover, patients with AN report feeling committed, and obliged to exercise, whereby postponing exercise results in guilt.(28)

There are several possible explanations for these findings. Environmental influences may contribute to the risk of developing an eating disorder. For example, the physical activity environment has the potential to increase exercisers' body awareness (i.e., mirrored walls, tight-fitting and revealing attire),(29) and the risk is higher among physical education students; because they experience the environment pressures regarding their performance, weight, and bodies, that raises the risk of engaging in disordered eating behaviors. Consistent with our results, Davis et al.(30) demonstrated that their ED patients exercised more than controls; a combination of excessive physical activity with a pressure to lose weight in activities that emphasize body image, weight and thinness is a deciding factor in the emergence of eating disorders.(31)

Since participating in sports and activities that have a strong focus on appearance are associated with increased risk for body image concerns and eating disorder symptoms for both male and female adolescents(32), physical activity is frequently considered as potential risk factors for the development of eating disorders. Likewise, a meta-analysis (33) declared that athletic participation among women is associated with an increased risk for disordered eating, and collegiate athletes tend to exhibit higher rates of anorexic and bulimic symptoms (34) and disordered eating behaviors (15) when compared with controls.

Another explanation for this association has been indicated by Adan et al.(35) that the association between hypothalamic–pituitary–adrenal (HPA) axis activity and food restriction increased in physical activity, and this relationship is mediated through body fat levels. Current research on exercise and eating be-

**Table 2.** The association of EAT-26 scores with anthropometric indices and physical activity levels

Variables	Physical activity	Weight	BMI	Waist	WHR
EAT-26					
r	0.216	0.138	0.171	0.207	0.201
p-value	0.002	0.047	0.013	0.003	0.004

*BMI: body mass index, EAT-26: eating attitude test, WHR: waists to hip ratio. Partial correlation test controlling for gender,  $P < 0.05$  is significant.*

haviors suggest that within individuals with ED, exercise is more like a compulsion than an addiction.(13) Additionally, an individual with an ED may have some concerns that an instant unpleasant change in appearance will occur if an exercise session is missed; and that exercise behavior may act as a means to escape the unpleasant effect associated with an ED. This feature of effect management has supported the role of exercise as a compensatory behavior as part of an ED.(13, 36)

On the contrary, another study by Catherine Boyd et al.(37) did not observe any relationship between the amount of exercise performed and the presence of an ED. A possible reason for the discrepancy in findings might be due to the differences in studied subjects. For the example, the Catherine Boyd et al.(37) study was conducted exclusively on females.

Previously it has been believed that eating disorders are more common among women than men(38). However new research has shown that the rate of body dissatisfaction in males, in the form of a strong inclination to increase muscularity, is now comparable in prevalence with females (39) and consistently eating disorders prevalence are increasing in the young men (40, 41) that may be due to a greater influence of socio-cultural factors especially among Iranian boys(42), that muscular ideals and great desire to larger muscles and physique can cause higher rates of disordered eating attitudes among male compared to female students,(43, 44) thus drive for muscularity and body shape explain our results.

Our findings indicate that the higher BMI and WHR are associated with increased risk of developing disordered eating attitudes. This correlation can be explained by the increasing trend toward having a lean body (45). These findings may be explained by the fact that persons with higher body fat mass are less satisfied with their body image than others. In this context, low self-esteem has already been shown as risk factors for ED(46).

Finally, the field of eating disorders and mental health is still new in the Iran; further research is needed to understand at a deeper level the reasons behind the increase in disordered eating attitudes among Iranian people such as found in this study and some of the correlates related to it. Additionally there are other studies (42) recommending more attention to eating disorders and predictive factors in Iranian males.

## Limitations

There are some limitations that need to be mentioned. Since this is a cross-sectional study we cannot draw any causal associations between physical activity levels and eating disorders. Furthermore, some of the data (e.g., physical activity levels) rely on self-report measures.

## Conclusions

This study documents that increased the amount of physical activity is correlated with eating disorder; Furthermore, males and females with disordered eating behavior are involved in relatively higher levels of physical activity. Future research is needed to elucidate the specific mechanisms that account for the links between athletic participation, exercise, and eating behavior. Indeed future research should focus on further investigating of exercise and eating disorder interaction on the quality of life and mood state, including both psychological and biological components, and further explore relationships on exercise levels, and the course of ED, anxiety and psychiatric traits. Additional research is needed to clarify the pattern of eating disorder prevalence amongst male collegiate athletes and determine if there is a relationship to sports type.

## Acknowledgements

This study was supported by the Vice Chancellor for Research of Tabriz University of Medical Sciences, IR Iran. We are very grateful to physical education students for their participations in the study. This article was a part of the data from an MSc thesis in health sciences in nutrition, registered in Tabriz University of Medical Sciences (ID = A\192).

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