

Eating disorders risk and its relation to self-esteem and body image in Iranian university students of medical sciences

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Abstract

Introduction and objectives Eating disorders are rapidly increasing in young adults. But, a few studies have examined the risk of eating disorders and body image in university students of non-Western societies. The current study aimed to assess eating disorders risk in relation to body image and self-esteem among Iranian university students.

Method The participants were 430 students from Tabriz, between April and May 2015. The 26-item Eating Attitude Test (EAT-26), Multidimensional Body-Self Relations Questionnaire (MBSRQ) and Rosenberg's Self-Esteem Questionnaires were used. EAT-26 score of 20 or more was considered as eating disorders risk cutoff.

Results Majority of the students (68 %) were females. The overall eating disorders risk was 9.5 % (7.5 and 10.5 % in men and women, respectively). Further, the prevalence of poor body image and low self-esteem was

34.2 and 16 %, respectively. Neither of the gender differences was statistically significant ($p > 0.05$). In simple logistic regression, there were significant associations between self-esteem, body image, parental education and eating disorders risk ($p < 0.025$). But, after adjustments for gender, age, Body Mass Index (BMI) and marital status, only self-esteem (OR = 0.37, 95 % = 0.16–0.87) and mother's education level (OR = 2.78, 95 % = 1.30–5.93) were predictors of eating disorders risk.

Conclusions The findings revealed that low self-esteem and mother's higher education may increase eating disorders risk and the predictive role of body image possibly is by other mediators such as self-esteem. This warrants awareness improvement and developing appropriate interventions targeting self-esteem and self-respect of students.

Keywords Eating disorders risk · Body image · Iranian university students · Self-esteem · Eating attitude · Young adults · Body satisfaction · Women's health

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Introduction

Eating disorders are considered as major substantially increasing public health issue. These disorders include anorexia nervosa, bulimia nervosa, binge eating disorder and eating disorder not otherwise specified [1]. Prevalence of these disorders doubled during the last two decades in Western societies [2]. Previously, eating disorders were more common in modern and industrial countries. But in recent years, the burden of these disorders has been extended to developing countries as well [3]. Generally, the eating disorders risk arises from interplay of various factors such as biological and familial characteristics, the socio-cultural context as well as psychological factors [4, 5].

Further, diverse types of eating disorders share some aspects of body image including weight concerns [1].

Body image, defined as people's individual psychological image of their physical appearance, is any positive or negative emotion of a person about shape and size of the body [6]. There are distinct standards of body for men and women in every society and issues arise when there are no agreements between the body image and ideal image [7]. Further, changes in cultural, economical and traditional structures in the society may influence body perceptions of individuals [8]. Thus, misconceptions of body image may lead to a variety of serious disorders, including major depressive disorders, eating disorders and low self-esteem [9].

Self-esteem, defined as certain amount of value that a person considers for him/herself, is suggested to impose a close relationship with every society's cultural norms [10]. Individuals with low self-esteem usually have relatively negative attributes rather than focusing on their abilities [11]. It has been shown that a strong relationship exists between low self-esteem and poor body image with regard to various demographic and socioeconomic characteristics [12]. Besides, in cognitive-behavioral models, low self-esteem is proposed as root of eating disorders and more specifically, anorexia and bulimia [13, 14].

Based on previous reports, higher education students similar to teenagers show high-risk behaviors leading to eating disorders, body dissatisfaction and purging manners like dieting [15].

The transition from high school and living with parents, to relatively independent lifestyle at university together with a competitive and vulnerable environment along with adoption of new social relations can lead to unhealthy behaviors among university students [15, 16].

Until now, to assess any possible association of body image and self-esteem with eating disorders, the majority of investigators have concentrated on adolescents and young female adults, either separately or in concurrent studies [17–20]. Gitau et al. [18, 20] from South Africa indicated that attitudes towards disordered eating of multiethnic urban adolescents were influenced by exposure to Western standards of thinness. They also revealed that risk of eating disorders was higher among boys with low self-esteem, while there were inverse correlations between disordered eating attitudes, self-esteem and body image among white females.

A number of the reports revealed a direct predictive role of eating disturbances in low body image [21, 22]; some suggested an indirect role of body image intermediating self-esteem [23, 24] and others failed to find a role for self-esteem [25, 26]. There are few researches with contradictory results, which assessed the predictive role of body image, self-esteem and other possible socio-demographic determinants using multivariate modeling in young adult samples [27, 28]. Most recent study conducted on

university students from Norway concluded that self-esteem and negative emotions have mediator roles between body dissatisfaction and eating disorders [27]. On the contrary, another study among nursing university students did not find any predictive role for self-esteem and body image in a final multivariate model [28].

The literature review of eating disorders or disturbed eating attitudes shows that the growing rate of these disorders is faster in non-Western countries [29]. As previously mentioned, prevalence of poor body image and low self-esteem, as eating disturbances risk factor, and their connections with each other is widely assessed in Western settings [17, 19, 21, 22]. However, research in this regard among young adults of both genders is relatively new, especially in non-Western societies, including the Middle East. A better understanding of these relationships could alleviate target-based preventive and/or therapeutic interventions against eating disorders in these populations.

Iran is a rapidly developing country with fairly tight family structures and also cultural and religious beliefs in human values and women's clothing (hijab) as well as a somewhat lower exposure of people to Western norms through the media. However, the higher tendency for the thinnest body image had also been reported in Iranian women [30].

Taken all together, the question remains whether self-esteem and body image are determinants of disturbed eating attitudes regardless of gender, BMI and other socio-demographic factors. Thus, this study aimed to (1) determine state of the body image and self-esteem and eating disorders risk among a relatively large sample of students studying at University of Medical Sciences in Tabriz, Northwest of Iran, (2) find out any possible relationship between eating disorders risk, self-esteem and body image in the participants and (3) ascertain the main determinants of disordered eating attitudes among the study population, considering the self-esteem and body image status.

Materials and methods

Participants

In this cross-sectional study, 430 students (males $n = 134$, females $n = 296$) from Tabriz University of Medical Sciences, Tabriz, Iran were recruited, in April and May, 2015. The sample size was calculated as 400 (Considering similar study by Safavi et al. [31]); but 450 students were recruited. To select the study population, a stratified random sampling method was applied. At first, all the seven schools of Tabriz University of Medical Sciences were chosen. Then, one or two classes were selected randomly considering proportional frequency of students in each school. The questionnaires were filled out by students before class sessions, with

the aid of a supervisor. The option of having results of the study by email was used as a persuasive factor for participants to complete the questionnaires.

The study procedure was confirmed by the ethics committee of the university, and subjects completed written informed consents.

Measures

The students completed the following four sections in the questionnaire form:

- The socio-demographic part: this part was collecting information on age, gender, self-reported height and weight (to calculate body mass index (BMI)), marital status and parental schooling level.
- EAT-26 questionnaire: 26-Item Eating Attitude Test (EAT-26) [32] is a widely used self-report measure of disordered eating attitude and risk of eating disorders. Recently, in an Iranian sample of university students, the usefulness of EAT-26, as a screening tool for identifying women at risk of developing eating disorders, was shown [33]. The Persian version of the questionnaire was previously validated by Gargari et al. [3]. The internal consistency (Cronbach's alpha) and test–retest reliability of this questionnaire were 0.75 and 0.85, respectively [3]. In the present study, the total score of 20 or more was considered as being at risk of eating disorders (disordered eating attitudes).
- MBSRQ: the Multidimensional Body-Self Relations Questionnaire (MBSRQ) was used to assess the body image. This 46-item questionnaire developed by Cash and colleagues [34] comprises the following six subscales: appearance evaluation, appearance orientation, fitness evaluation, fitness orientation, subjective weight and body areas satisfaction. The Persian version of the tool was previously validated with test–retest reliability of 0.89 and internal validity (Cronbach's alpha) of 0.95 [31]. The items were rated on a 5-point Likert scale, scored 1–5 and yielding a total score of 230. Participants were classified as poor, moderate and a good image of the body based on the tertiles of the MBSRQ's total score.
- Rosenberg's self-esteem scale: 10-Item Rosenberg's Self-Esteem Scale (SES) [35] was applied to assess the level of self-esteem. A total score of 0–30 was used for 10 items that were scored between 0 and 3. Respondents with a score of 15 or less were considered as low self-esteem, while those that scored more than 15 were considered as normal. The Persian version of SES was utilized. The questionnaire was validated (Cronbach's alpha = 0.70) with test–retest reliability of 0.80 by Gargari et al. [36].

Statistical analysis

Normality of data was assessed by the Kolmogorov–Smirnov test. Descriptive data are presented as mean and standard deviations or median, 25th and 75th percentile. BMI was calculated by dividing weight (in kilogram) by the square of height (in meter). Chi-square tests were used to compare the qualitative variables between genders. Independent-samples *t* test or Mann–Whitney *U* test was used to compare BMI and mean scores of questionnaires in students with different eating attitudes test and self-esteem scores. Comparison of students' body image and body mass index categories was carried out using one-way ANOVA or Kruskal–Wallis tests. Uni- and multivariate logistic regression analyses (Backward: LR) were used to determine the odds ratio of eating disorders risk. The $p < 0.05$ value was considered as statistically significant. All data were analyzed using the SPSS version 17 (SPSS Inc., Chicago, IL).

Results

Socio-demographic variables

Out of 450 questionnaires, 430 were completed (compliance rate = 95 %). As shown in Table 1, the mean age of

Table 1 General characteristics of the studied subjects ($n = 430$)

| Variable | Mean | SD |
|-------------------------|--------|------------------------|
| Age | 21.09 | 2.24 |
| BMI | 21.86 | 2.95 |
| SES | 18.96 | 3.85 |
| | Median | 25th, 75th percentiles |
| EAT-26 | 7.00 | 3.00, 13.00 |
| MBSRQ | 165.00 | 153.00, 178.25 |
| | N | % |
| Gender | | |
| Female | 296 | 68.80 |
| Male | 134 | 31.20 |
| Marital status | | |
| Single | 392 | 92.90 |
| Married | 30 | 7.10 |
| Father's education | | |
| Non-university educated | 180 | 41.86 |
| University educated | 250 | 58.14 |
| Mother's education | | |
| Non-university educated | 285 | 66.28 |
| University educated | 145 | 33.72 |

BMI body mass index, *EAT-26* eating attitude test, *SES* self-esteem scale, *MBSRQ* Multidimensional Body-Self Relations Questionnaire

students was 21.09 ± 2.24 years and 68.8 % of them were female. In total, 41.86 and 66.27 % of the participants had university-educated father or mother, respectively. There were gender differences in parental schooling; more women as compared to men had both parents with a university degree (36.1 vs 24.4 %, $\chi^2 = 8.6$, $df = 2$, $p = 0.013$) (data not shown). Regarding marital status, 7.1 % of students were married.

The average BMI of the university students was 21.86 ± 2.95 kg/m² (22.76 ± 3.09 and 21.51 ± 2.77 in men and women, respectively, $t = 3.85$, $p < 0.001$).

Body image, eating attitudes, and self-esteem findings

In total, 34.2 % of the participants had a poor body image (35.8 and 30.6 % in women and men, respectively). For the eating attitudes, median, 25th and 75th percentiles of EAT-26 questionnaire scores were 7, 3 and 13 for study subjects, respectively. The overall risk of eating disorders among students was 9.5 % (10.5 and 7.5 % in women and men, respectively).

A total of 16 % of students had low self-esteem (18.7 vs 14.9 % in men and women, respectively). There were no significant associations between gender and other variables, including body image, eating attitudes and self-esteem. As shown in Table 2, students at risk of eating disorders (EAT-26 score of 20 or more) had a significantly lower mean score of self-esteem ($p = 0.011$). However, the differences in body image scores median and average BMI of those with disordered eating attitudes did not reach a significant level as compared to those with normal eating attitudes (EAT-26 score of less 20). In the general linear model, the main effect for gender was not significant (Wilks' Lambda = 0.801, $p = 0.068$); hence, it was significant for BMI (Wilks' Lambda = 0, $p < 0.001$). There was no statistically significant interaction between gender and BMI (Wilks' Lambda = 0.311, $p = 0.425$).

Table 3 presents the mean of BMI and self-esteem score as well as the median of body image score and eating attitude test for participants categorized into poor, moderate and good body images. Students with poor body image had a higher median score of EAT-26 and lower mean scores of self-esteem ($p = 0.036$, $p < 0.001$, respectively).

Table 4 shows mean and SD of BMI and SES score, and also median, 25th and 75th percentiles for EAT-26 and body image scores in students with low and normal self-esteem. Participants with low self-esteem had a significantly higher median of the EAT-26 score ($p < 0.001$) together with a lower median score of body image ($p < 0.001$) as compared to their normal self-esteem counterparts. The observed difference for BMI average was not statistically significant.

The associations of socio-demographic factors with eating disorders risk was examined by logistic regression analysis and summarized in Table 5. The simple logistic regression analysis showed significant associations between self-esteem, body image status and eating disorders risk among the study participants ($p < 0.05$). Students with normal self-esteem and those with moderate or good body image had 67 and 52 % lower odds of eating disorders risk than students with low self-esteem and poor body image students, respectively. Additionally, the chance of being at risk of eating disorders, in students belonging to families with university-educated fathers, was 2.88 times (OR = 2.88, 95 % = 1.34–6.19, $p = 0.007$) and with university-educated mothers was 2.63 times (OR = 2.63, 95 % = 1.38–5.01, $p = 0.003$) higher than their counterparts with non-university-educated parents. In the next step, all the variables were entered in multiple logistic regression analysis by Backward-LR method. Adjusting of socio-demographic factors by logistic regression led to a model, which includes self-esteem status and mother's education. Based on the results, the odds of disordered eating attitudes in subjects with normal self-esteem was 63 % lower than those with low self-esteem (OR = 0.37,

Table 2 Body mass index and mean or median scores of students with regards to eating attitudes categories ($n = 430$)

| Variable | Normal eating attitudes ($n = 388$) | Disordered eating attitudes ($n = 42$) | p (v) |
|----------|--|---|---------|
| | Median (25th, 75th percentile) | | |
| EAT-26 | 6.00 (3.00, 10.00) | 25.50 (22.97, 31.57) | <0.001* |
| MBSRQ | 166.00 (154.80, 178.00) | 158.50 (145.75, 179.25) | 0.134* |
| | Mean \pm SD | | |
| SES | 19.17 \pm 3.66 | 17.08 \pm 4.95 | 0.011** |
| BMI | 21.81 \pm 2.93 | 22.82 \pm 2.79 | 0.60** |

Disordered eating attitudes are defined as a total score of 20 or more on EAT-26 questionnaire

BMI body mass index, EAT-26 eating attitude test, SES self-esteem scale, MBSRQ Multidimensional Body-Self Relations Questionnaire

* Mann–Whitney U test

** Independent-samples t test

Table 3 Mean and standard deviation of body mass index, the score of eating attitude test, self-esteem and body image in different body image categories ($n = 430$)

| Variable | Poor body image ($n = 147$) | Moderate body image ($n = 144$) | Good body image ($n = 139$) | p (v) |
|----------|--------------------------------|-----------------------------------|-------------------------------|-------------|
| | Median (25th, 75th percentile) | | | |
| EAT-26 | 8.00 (4.00, 15.00) | 6.00 (3.00, 11.75) | 6.00 (3.00, 10.00) | 0.036* |
| MBSRQ | 149.00 (142.00, 153.00) | 166.00 (163.00, 170.00) | 183.00 (179.00, 191.00) | <0.001* |
| | Mean \pm SD | | | |
| SES | 17.22 \pm 3.72 | 18.80 \pm 3.28 | 20.98 \pm 3.58 | <0.001** |
| BMI | 22.31 \pm 3.06 | 21.70 \pm 2.68 | 21.66 \pm 2.99 | 0.143** |

Poor, moderate and good body images are defined as 1st, 2nd and 3rd tertiles of scores on MBSRQ

BMI body mass index, *EAT-26* eating attitude test, *SES* self-esteem scale, *MBSRQ* Multidimensional Body-Self Relations Questionnaire

* Kruskal–Wallis test

** One-way ANOVA test

Table 4 Body mass index and mean or median scores of students with regard to self-esteem categories in participants ($n = 430$)

| Variable | Low self-esteem ($n = 69$) | Normal self-esteem ($n = 361$) | p (v) |
|----------|--------------------------------|----------------------------------|-------------|
| | Median (25th, 75th percentile) | | |
| EAT-26 | 10.04 (6.00, 18.00) | 6.00 (3.00, 11.00) | <0.001* |
| MBSRQ | 153.00 (143.50, 170.00) | 168.00 (156.00, 179.00) | <0.001* |
| | Mean \pm SD | | |
| SES | 13.31 \pm 2.45 | 20.05 \pm 3.03 | <0.001** |
| BMI | 22.24 \pm 2.58 | 21.84 \pm 2.99 | 0.328** |

Low self-esteem is defined as a total score of 15 or less on Rosenberg' Self-Esteem Questionnaire

BMI body mass index, *EAT-26* eating attitude test, *SES* self-esteem scale, *MBSRQ* Multidimensional Body-Self Relations Questionnaire

* Mann–Whitney U test

** Independent-samples t test

95 % = 0.16–0.87, $p = 0.022$). Finally, in students whose mothers were highly educated, odds of eating disorders risk was 2.78 times higher than that of students who had non-university-educated mothers (OR = 2.78, 95 % = 1.30–5.93, $p = 0.009$).

Discussion

The current study determined the body image, self-esteem and eating disorders risk as well as their relationship, among the male and female students of medical university in Tabriz, Iran. The risk of eating disorders among the study population was 9.5 % (10.5 and 7.5 % in women and men, respectively). There was no significant association between gender and eating disorders risk. Historically, it is believed that eating disorders are more common among women [37]. However, in recent years, it has been shown that probably past studies had underestimated the eating disorders' prevalence among men, and in fact, it is rising dramatically in men, too [37]. The reported prevalence of disordered eating attitudes in the other regions of Iran was

25.7 % in Guilan [38] and 21.5 % in the capital city, Tehran (among female university students) [31]. Iran is a multi-ethnicity country with relatively diverse cultures. The influence of foreign cultures on Tabriz probably is less as compared to Tehran which is a capital city. Additionally, in Tabriz, traditional family structure is predominant, where more people are committed to closer familial relations of genders before marriage. Many university students still live with their parents, making the influence of independence and peers on their eating attitudes limited. It has been mentioned that socioeconomic status and income, could affect the eating disorders risk across cultures [39]. About half of the study students had university-educated father. They were not asked about other aspects of socioeconomic status. In one of the mentioned domestic studies, father's job status was significantly associated with eating disorders risk [31], but another one did not report any data regarding socioeconomic status of participants [38].

In comparison, neither of these studies reported the average score of participants in EAT-26 questionnaire. The finding of this study is in line with Rouzitalab and

Table 5 Association between socio-demographic variables and eating disorders risk using uni- and multivariate logistic regression

| Variable | Unadjusted | | Adjusted | |
|------------------------------------|----------------------|----------------|----------------------|----------------|
| | Odds ratio (95 % CI) | <i>p</i> value | Odds ratio (95 % CI) | <i>p</i> value |
| Gender | | | | |
| Male (referent) | | | | |
| Female | 1.31 (0.64, 2.69) | 0.465 | — | — |
| BMI | 1.13 (0.99, 1.24) | 0.062 | — | — |
| Age | 1.04 (0.91, 1.19) | 0.576 | — | — |
| SES | | | | |
| Low self-esteem (referent) | | | | |
| Normal self-esteem | 0.33 (0.16, 0.67) | 0.002 | 0.37 (0.16, 0.87) | 0.022 |
| MBSRQ | | | — | — |
| Poor body image (referent) | | | | |
| Moderate or good body image | 0.48 (0.25, 0.91) | 0.025 | — | — |
| Father's education | | | | |
| Non-university educated (referent) | | | | |
| University educated | 2.88 (1.34, 6.19) | 0.007 | — | — |
| Mother's education | | | | |
| Non-university educated (referent) | | | | |
| University educated | 2.63 (1.38, 5.01) | 0.003 | 2.78 (1.30, 5.94) | 0.009 |
| Marriage status | | | | |
| Single (referent) | | | | |
| Married | 1.43 (0.47, 4.33) | 0.523 | — | — |

Dependent variable: eating disorders risk (normal as referent vs at risk). After univariate analysis, all variables including significant and non-significant, were entered in the multivariate analyses using Backward: LR and variables of the model that was included in the final step are presented

An acceptable model fit showed by Hosmer and Lemeshow test [Chi-square (6) = 3.17, *p* value = 0.923]

A total of 91.3 % of subjects were correctly classified

p values below 0.05 are marked in bold

OR odds ratio, CI confidence interval, BMI body mass index, EAT-26 eating attitude test, SES self-esteem scale, MBSRQ Multidimensional Body-Self Relations Questionnaire

colleagues' [40] research, which reported that the risk of eating disorders in Physical Education Students of Tabriz (our region) was less than that of Tehran, Arab countries and some European countries. In other countries, a study in United Arab Emirates reported that 20 and 22 % of female and male students, respectively, were at risk of eating disorders [41]. The higher prevalence of disordered eating attitudes in this study may be attributed to westernization and rapid increase in socioeconomic status as well as other factors such as nutrition transition [42]. Additionally, the prevalence of disturbed eating attitudes for female medical students in England was reported to be 19 % [43] and for Latino university students, it was 9.59 % (11.80 % in women and 5.05 % in men) [44]. The results of this study are almost similar to that of the Latino students. Ethno-cultural affiliation in some subcultures may provide more body satisfaction for individuals. In other words, the level of internalization for Western ideals of beauty among them is lower, which may positively affect their eating attitudes [17, 45]. Different levels of impressionability to

westernization in these societies, socio-cultural and ethnic factors as well as the role of media and economic development could explain the diverse results [3].

The results of this study showed that 34.2 % of students experienced poor perception of their body (35.8 vs 30.6 % in women and men, respectively). Surveys indicated that body image misconception could lead to some health issues such as depression, substance abuse, low self-esteem and eating disorders [9]. Recently, Alipour et al. [30], in their study using Figure Rating Scale (FRS), reported that about half of female university students had body image dissatisfaction. But, in the literature, no study was found in Iran which addresses body image in the two genders of university students. Further, body dissatisfaction in a study among university staffs with a mean age of 33 years was about 40 % [46]. In line with recent research, the study population of the current study had body image misconception approximately equal in both genders. Interestingly, in other societies, it has been indicated that fewer women than men are satisfied with their bodies [47, 48].

Increasing trend of global internet and social networks use, even with possible positive effects of restrictions in accessibility of information regarding Western standards of beauty through images on body-esteem in non-Western countries such as Iran, could lead to relative vulnerability of young people to internalization of Western cultures. Peers and parents can also reinforce the effect of media on body image [49]. However, use of hijab or Islamic head and body-cover could have some protective role against body concerns. Dunkel et al. [50] revealed that Muslim women in hijab show fewer drive for thin body and experience lower pressure to reach a thin-ideal norm of beauty in comparison with women wearing Western dresses. One explanation for this could be non-anxious relationship with God instead of internalizing cultural norms of beauty [51]. Therefore, interaction of different factors including socio-cultural factors and religion could determine body image status of individuals [50].

In the current study, simple logistic regression analysis showed an inverse association between disordered eating attitudes and body image. This finding is inconsistent with results of Safavi et al. [31] and Costarelli et al. [52] among women. However, it is in line with a Taiwanese study which found a significant relationship between body dissatisfaction and disturbed eating attitudes in male and female adolescents [53]. The discrepancy between the findings of the studies could have arisen from the confounding effects of some factors such as body mass, socioeconomic status, ethnic and the religion differences as well as using diverse assessment tools.

For self-esteem, in our sample population, there was a reverse correlation between self-esteem and risk of eating disorders. In the literature, the results on possible relationship between low self-esteem and eating disturbance are conflicting. Some researchers did not observe any significant relationship between self-esteem and eating disorders [25, 26]. However, in some studies, low self-esteem was mentioned as a possible predictor of eating disturbances [54, 55]. Nevertheless, based on some findings, low self-esteem could be the risk factor of eating disorders but in combination with other factors such as emotion perfectionism [56].

In the present study, university students with less body satisfaction scored significantly lower self-esteem as compared to their counterparts who had better body images. This finding was supported by a recent study in Norway [48]. Meanwhile, another study found a significant correlation between body image and self-esteem only among women [23]. They related this finding to the fact that men have been attracted to the opposite sex virtually by their body. Therefore, women have a greater desire to reach cultural body ideals than men.

It has been suggested that poor body image can lead to eating disorders, directly [21, 22] or through a lowered

self-esteem [23, 24]. It is worthy to note that conclusions on these possible links were mainly based on researches conducted in the Western societies, whereas the accuracy of these possible relationships in non-Western societies, which have different cultural, religious and social specialties, is still less clear [24]. In the current study, self-esteem, body image and parents' education level correlated to eating disorders risk. But surprisingly, after adjustments for gender, BMI, age and marital status, only self-esteem and mother's education level were main predictors of eating disorders risk. The finding regarding the predictive role of mother's higher education level on eating disorders risk has been previously reported in European society [39]. This finding could be related to higher socioeconomic status and internal and external demands on eating disorders prediction or mothers' influences on dieting behaviors of their children. Elimination of body image from the final model of multivariate analysis shows that self-esteem and mother's education have stronger relationship with disordered eating attitudes. Therefore, it appears that the effects of other factors such as body image on eating disorders risk are indirectly by self-esteem and mother's education level.

It seems that other factors such as poor body image may increase risk of eating disorders indirectly, most probably via low self-esteem.

These results are in line with findings of a recent study in Norway, which concluded that self-esteem and depression are mediators for the relationship between body dissatisfaction and the eating disorders in university students [48]. It should be mentioned that levels of depression were not assessed in our study. In support of these findings, there is evidence that using an educational intervention with focus on self-esteem resulted in improved body image and long-term positive changes in eating attitudes and behaviors in adolescents [57].

The current study findings were contrary to the other research among Turkish nursing students, which reported that body image and self-esteem were not present in the final multivariate model of eating disorders risk [28]. The cutoff for abnormal eating attitudes at EAT-26 in their study was higher than our study. Diverse socio-cultural factors, differences in sample size, assessing tools used and statistical analysis methods can also explain inconsistent findings.

There are some limitations in the current study. The study is a cross-sectional one, so the causal relationship between different variables could not be determined. Furthermore, the data for this study were collected via self-report questionnaires, which in an ideal manner, face-to-face interviews, could result in the more valid findings. However, validated instruments were used and the subjects completed the questionnaires under the authors' supervision, which could result in more valid data. Finally, some studies suggested a predictive role of other factors such as

depression for eating disorders risk and the authors were limited to considering those factors. Therefore, it is proposed that future studies should assess the other potential psychological determinants of eating disorders risk.

Conclusion

The risk of eating disorders is relatively high among Iranian university students. Low self-esteem and higher parental education may increase eating disorders risk and probably body dissatisfaction has an indirect predictive role. The development of appropriate strategies is necessary to improve self-respect among young adults.

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Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical approval All procedures performed in the current study were in accordance with the ethical standards of the Ethics Committee of Tabriz University of Medical Sciences (Tabriz, Iran) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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References

- Klein DA, Walsh BT (2004) Eating disorders: clinical features and pathophysiology. *Physiol Behav* 81(2):359–374. doi:10.1016/j.physbeh.2004.02.009
- Mitchison D, Hay P, Slewa-Younan S, Mond J (2012) Time trends in population prevalence of eating disorder behaviors and their relationship to quality of life. *PLoS One* 7(11):e48450. doi:10.1371/journal.pone.0048450
- Gargari BP, Kooshavar D, Sajadi NS, Karami S, Shahrokhi H (2008) Risk of eating disorders among high school females of Tabriz in 2007. *Med J Tabriz Univ Med Sci* 30(4):21–26 (In Persian)
- Culbert KM, Racine SE, Klump KL (2015) Research Review: what we have learned about the causes of eating disorders—a synthesis of sociocultural, psychological, and biological research. *J Child Psychol Psychiatry* 56(11):1141–1164. doi:10.1111/jcpp.12441
- Emmett SW (2013) Theory and treatment of anorexia nervosa and bulimia: biomedical sociocultural and psychological perspectives. Routledge, New York. doi:10.4324/9780203776193
- Rosen JC (1995) Assessment and treatment of body image disturbance. In: Brownell KD, Fairburn CG (eds) *Eating disorders and obesity: a comprehensive handbook*. The Guilford Press, New York, pp 369–378
- Sobal J, Stunkard AJ (1989) Socioeconomic status and obesity: a review of the literature. *Psychol Bull* 105(2):260–275. doi:10.1037//0033-2909.105.2.260
- Akdevelioglu Y, Gümüş H (2010) Eating disorders and body image perception among university students. *Pak J Nutr* 9(12):1187–1191. doi:10.3923/pjn.2010.1187.1191
- Varnes JR, Stelfox ML, Janelle CM, Dorman SM, Dodd V, Miller MD (2013) A systematic review of studies comparing body image concerns among female college athletes and non-athletes, 1997–2012. *Body Image* 10(4):421–432. doi:10.1016/j.bodyim.2013.06.001
- Pope AW, McHale SM, Craighead WE (1988) *Self-esteem enhancement with children and adolescents*. Pergamon Press, Oxford, UK
- Iancu I, Bodner E, Ben-Zion IZ (2015) Self esteem, dependency, self-efficacy and self-criticism in social anxiety disorder. *Compr Psychiatry* 58:165–171. doi:10.1016/j.comppsy.2014.11.018
- Neumark-Sztainer D, Cafri G, Wall M (2007) Steroid use among adolescents: longitudinal findings from Project EAT. *Pediatrics* 119(3):476–486. doi:10.1016/s1073-5437(08)70864-7
- Fairburn CG (2008) Eating disorders: The transdiagnostic view and the cognitive behavioral theory. In: Fairburn CG (ed) *Cognitive behavior therapy and eating disorders cognitive behavior therapy and eating disorders*. Guilford Press, Guilford, pp 7–22
- Fairburn CG, Shafran R, Cooper Z (1999) A cognitive behavioural theory of anorexia nervosa. *Behav Res Ther* 37(1):1–13. doi:10.1016/S0005-7967(98)00102-8
- Vohs KD, Heatherton TF, Herrin M (2001) Disordered eating and the transition to college: a prospective study. *Int J Eat Disord* 29(3):280–288. doi:10.1002/eat.1019
- Cooley E, Toray T (2001) Body image and personality predictors of eating disorder symptoms during the college years. *Int J Eat Disord* 30(1):28–36. doi:10.1002/eat.1051
- Quick VM, Byrd-Bredbenner C (2014) Disordered eating, socio-cultural media influencers, body image, and psychological factors among a racially/ethnically diverse population of college women. *Eat Behav* 15(1):37–41. doi:10.1016/j.eatbeh.2013.10.005
- Gitau TM, Micklesfield LK, Pettifor JM, Norris SA (2014) Eating attitudes, body image satisfaction and self-esteem of South African Black and White male adolescents and their perception of female body silhouettes. *J Child Adolesc Ment Health* 26(3):193–205. doi:10.2989/17280583.2014.901224
- Michou M, Costarelli V (2011) Disordered eating attitudes in relation to anxiety levels, self-esteem and body image in female basketball players. *J Exerc Sci Fit* 9(2):109–115. doi:10.1016/s1728-869x(12)60006-9
- Gitau TM, Micklesfield LK, Pettifor JM, Norris SA (2014) Ethnic differences in eating attitudes, body image and self-esteem among adolescent females living in urban South Africa. *Afr J Psychiatry*. doi:10.4172/1994-8220.1000101
- Keery H, Van den Berg P, Thompson JK (2004) An evaluation of the tripartite influence model of body dissatisfaction and eating disturbance with adolescent girls. *Body Image* 1(3):237–251. doi:10.1016/j.bodyim.03.001
- Ferrand C, Champely S, Filaire E (2009) The role of body-esteem in predicting disordered eating symptoms: a comparison of French aesthetic athletes and non-athletic females. *Psychol Sport Exerc* 10(3):373–380. doi:10.1016/j.psychsport.2008.11.003
- Furnham A, Badman N, Sneade I (2002) Body image dissatisfaction: gender differences in eating attitudes, self-esteem, and reasons for exercise. *J Psychol* 136(6):581–596. doi:10.1080/00223980209604820
- Soo KL, Shariff ZM, Taib MNM, Samah BA (2008) Eating behaviour, body image, and self-esteem of adolescent girls in

- Malaysia. *Percept Mot Skills* 106(3):833–844. doi:[10.2466/pms.106.3.833-844](https://doi.org/10.2466/pms.106.3.833-844)
25. Cohen DL, Petrie TA (2005) An examination of psychosocial correlates of disordered eating among undergraduate women. *Sex Roles* 52(1–2):29–42. doi:[10.1007/s11199-005-1191-x](https://doi.org/10.1007/s11199-005-1191-x)
 26. Rogers RL, Petrie TA (2001) Psychological correlates of anorexic and bulimic symptomatology. *J Couns Dev* 79(2):178–187. doi:[10.1002/j.1556-6676.2001.tb01958.x](https://doi.org/10.1002/j.1556-6676.2001.tb01958.x)
 27. Brechan I, Kvale IL (2015) Relationship between body dissatisfaction and disordered eating: mediating role of self-esteem and depression. *Eat Behav* 17:49–58. doi:[10.1016/j.eatbeh.2014.12.008](https://doi.org/10.1016/j.eatbeh.2014.12.008)
 28. Celik S, Ugur BA, Aykurt FA, Bektas M (2015) Eating attitudes and related factors in Turkish nursing students. *Nurs Midwifery Stud* 4(2):e25479. doi:[10.17795/nmsjournal25479](https://doi.org/10.17795/nmsjournal25479)
 29. Makino M, Tsuboi K, Dennerstein L (2004) Prevalence of eating disorders: a comparison of Western and non-Western countries. *Med Gen Med* 6(3):49
 30. Alipour B, Abbasalizad Farhangi M, Dehghan P, Alipour M (2015) Body image perception and its association with body mass index and nutrient intakes among female college students aged 18–35 years from Tabriz, Iran. *Eat Weight Disord* 20(4):465–471. doi:[10.1007/s40519-015-0184-1](https://doi.org/10.1007/s40519-015-0184-1)
 31. Safavi M, Mahmoodi M, Roshandel A (2009) Assessment of body image and its relationship with eating disorders among female students of Islamic Azad University, Tehran center branch. *Med Sci J Islam Azad Univ Tehran Med Branch* 19(2):129–134 (**in Persian**)
 32. Garner DM, Garfinkel PE (1979) The eating attitudes test: an index of the symptoms of anorexia nervosa. *Psychol Med* 9(2):273–279. doi:[10.1017/s0033291700030762](https://doi.org/10.1017/s0033291700030762)
 33. Ahmadi S, Moloodi R, Zarbakh M-R, Ghaderi A (2014) Psychometric properties of the Eating Attitude Test-26 for female Iranian students. *Eat Weight Disord* 19(2):183–189. doi:[10.1007/s40519-014-0106-7](https://doi.org/10.1007/s40519-014-0106-7)
 34. Cash TF (1997) How do you feel about your body? In: *The body image workbook: an 8-step program for learning to like your looks*. New Harbinger Publications, Inc, Oakland, CA, pp 61–65
 35. Rosenberg M (1965) *Society and the adolescent self-image*. Princeton University, Princeton. doi:[10.2307/2575639](https://doi.org/10.2307/2575639)
 36. Gargari B, Khadem-Haghighian M, Taklifi E, Hamed-Behzad M, Shahraki M (2010) Eating attitudes, self-esteem and social physique anxiety among Iranian females who participate in fitness programs. *J Sport Med Phys Fit* 50(1):79–84
 37. Strother E, Lemberg R, Stanford SC, Turberville D (2012) Eating disorders in men: underdiagnosed, undertreated, and misunderstood. *Eat Disord* 20(5):346–355. doi:[10.1080/10640266.2012.715512](https://doi.org/10.1080/10640266.2012.715512)
 38. Mollazadeh E, Kafi S, Yeganeh T (2013) Relationship between mental health and eating disorders in female students of Guilan University. *J Qazvin Univ Med Sci* 16(4):54–60 (**in Persian**)
 39. Goodman A, Heshmati A, Koupil I (2014) Family history of education predicts eating disorders across multiple generations among 2 million Swedish males and females. *PLoS One* 9(8):e106475. doi:[10.1371/journal.pone.0106475](https://doi.org/10.1371/journal.pone.0106475)
 40. Rouzitalab T, Pourghassem Gargari B, Amirasan R, Asghari Jafarabadi M, Farsad Naeimi A, Sanoobar M (2015) The relationship of disordered eating attitudes with body composition and anthropometric indices in physical education students. *Iran Red Crescent Med J* 17(11):e20727. doi:[10.5812/ircmj.20727](https://doi.org/10.5812/ircmj.20727)
 41. Schulte SJ, Thomas J (2013) Relationship between eating pathology, body dissatisfaction and depressive symptoms among male and female adolescents in the United Arab Emirates. *Eat Behav* 14(2):157–160. doi:[10.1016/j.eatbeh.2013.01.015](https://doi.org/10.1016/j.eatbeh.2013.01.015)
 42. Musaiger AO, Al-Mannai M, Al-Lalla O (2014) Risk of disordered eating attitudes among male adolescents in five Emirates of the United Arab Emirates. *Int J Eat Disord* 47(8):898–900. doi:[10.1002/eat.22256](https://doi.org/10.1002/eat.22256)
 43. Szweda S, Thorne P (2002) The prevalence of eating disorders in female health care students. *Occup Med* 52(3):113–119. doi:[10.1093/occmed/52.3.113](https://doi.org/10.1093/occmed/52.3.113)
 44. Reyes-Rodriguez ML, Franko DL, Matos-Lamour A, Bulik CM, Von Holle A, Camara-Fuentes LR, Rodriguez-Anglero D, Cervantes-Lopez S, Suarez-Torres A (2010) Eating disorder symptomatology: prevalence among Latino college freshmen students. *J Clin Psychol* 66(6):666–679. doi:[10.1002/jclp.20684](https://doi.org/10.1002/jclp.20684)
 45. Rubin LR, Fitts ML, Becker AE (2003) “Whatever feels good in my soul”: body ethics and aesthetics among African American and Latina women. *Cult Med Psychiatry* 27(1):49–75. doi:[10.1023/a:1023679821086](https://doi.org/10.1023/a:1023679821086)
 46. Kargamovin Z, Asadi Z, Rashidkhani B, Azar M (2013) Assessing body image and its relation with body mass index, food group consumption and physical activity among the University of Economic Sciences. *Iran J Endocrinol Metab* 14(5):455–463 (**in Persian**)
 47. Gillen MM, Lefkowitz ES (2012) Gender and racial/ethnic differences in body image development among college students. *Body Image* 9(1):126–130. doi:[10.1016/j.bodyim.2011.09.004](https://doi.org/10.1016/j.bodyim.2011.09.004)
 48. Brechan I, Kvale IL (2015) Relationship between body dissatisfaction and disordered eating: mediating role of self-esteem and depression. *Eat Behav* 17:49–58. doi:[10.1016/j.eatbeh.2014.12.008](https://doi.org/10.1016/j.eatbeh.2014.12.008)
 49. McCabe MP, Ricciardelli LA (2005) A prospective study of pressures from parents, peers, and the media on extreme weight change behaviors among adolescent boys and girls. *Behav Res Ther* 43(5):653–668. doi:[10.1016/j.brat.2004.05.004](https://doi.org/10.1016/j.brat.2004.05.004)
 50. Dunkel TM, Davidson D, Qurashi S (2010) Body satisfaction and pressure to be thin in younger and older Muslim and non-Muslim women: the role of Western and non-Western dress preferences. *Body Image* 7(1):56–65. doi:[10.1016/j.bodyim.2009.10.003](https://doi.org/10.1016/j.bodyim.2009.10.003)
 51. Homan KJ, Cavanaugh BN (2013) Perceived relationship with God fosters positive body image in college women. *J Health Psychol* 18(12):1529–1539. doi:[10.1177/1359105312465911](https://doi.org/10.1177/1359105312465911)
 52. Costarelli V, Demerzi M, Stamou D (2009) Disordered eating attitudes in relation to body image and emotional intelligence in young women. *J Hum Nutr Diet* 22(3):239–245. doi:[10.1111/j.1365-277x.2009.00949.x](https://doi.org/10.1111/j.1365-277x.2009.00949.x)
 53. Wong Y, Lin J-S, Chang Y-J (2014) Body satisfaction, emotional intelligence, and the development of disturbed eating: a survey of Taiwanese students. *Asia Pac J Clin Nutr* 23(4):651. doi:[10.6133/apjcn.2014.23.4.02](https://doi.org/10.6133/apjcn.2014.23.4.02)
 54. Button E, Sonuga-Barke E, Davies J, Thompson M (1996) A prospective study of self-esteem in the prediction of eating problems in adolescent schoolgirls: questionnaire findings. *Br J Clin Psychol* 35(2):193–203. doi:[10.1111/j.2044-8260.1996.tb01176.x](https://doi.org/10.1111/j.2044-8260.1996.tb01176.x)
 55. Jacobi C, Hayward C, de Zwaan M, Kraemer HC, Agras WS (2004) Coming to terms with risk factors for eating disorders: application of risk terminology and suggestions for a general taxonomy. *Psychol Bull* 130(1):19–65. doi:[10.1037/0033-2909.130.1.19](https://doi.org/10.1037/0033-2909.130.1.19)
 56. Mas MB, Navarro MLA, Jiménez AML, Pérez IT, del Río Sánchez C, San Gregorio MAP (2011) Personality traits and eating disorders: mediating effects of self-esteem and perfectionism. *Int J Clin Health Psychol* 11(2):205–227
 57. O’Dea JA, Abraham S (2000) Improving the body image, eating attitudes, and behaviors of young male and female adolescents: a new educational approach that focuses on self-esteem. *Int J Eat Disord* 28(1):43–57. doi:[10.1002/\(sici\)1098-108x\(200007\)28:1<43:aid-eat6>3.3.co;2-4](https://doi.org/10.1002/(sici)1098-108x(200007)28:1<43:aid-eat6>3.3.co;2-4)