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### RESEARCH ARTICLE

## Eating Disorder Risk and Factors Associated with Obesity Prejudice Among University Students: A cross-sectional descriptive study

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#### KEYWORDS

Feeding and Eating Disorders;  
Obesity;  
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Universities;  
Students.

➤ **Eating Disorder Risk and Factors Associated with Obesity Prejudice Among University Students: A cross-sectional descriptive study**

#### ABSTRACT

**Introduction:** The aim of this study is to evaluate eating disorder risk and factors associated with obesity prejudice among university students.

**Methodology:** This cross-sectional descriptive study was consisted of 1,449 university students in Turkey. Anthropometric measurements were self-reported and eating disorder and obesity prejudice symptoms were measured via validated scales.

**Results:** Prevalence of students at low risk for eating disorder was 88.2%, while 60.3% of them were prone to obesity prejudice and 27% of them were obesity prejudiced. The mean eating disorder scores of the underweight and the normal weight group were significantly lower than the overweight group ( $p=0.003$  and  $p=0.019$ , respectively). The difference between the mean obesity prejudice scores of the normal weight group and the overweight group was found to be significant ( $p=0.002$ ). Moreover, in the multiple linear regression analysis, the overweight group had a significant association with obesity prejudice ( $p<0.001$ ).

**Conclusions:** The risk of eating disorder and obesity prejudice increases among overweight/obese university students. Early prediction of eating disorder and obesity prejudice is crucial to prevent health problems such as obesity and related diseases among university students.



## PALABRAS CLAVE

Trastornos de Alimentación y de la Ingestión de Alimentos;

Obesidad;

Prejuicios;

Universidades;

Estudiantes.

### Riesgo de Trastornos Alimentarios y Factores Asociados al Prejuicio de Obesidad en Estudiantes Universitarios: Un estudio descriptivo transversal

#### RESUMEN

**Introducción:** El objetivo de este estudio es evaluar el riesgo de trastornos alimentarios y los factores asociados al prejuicio por la obesidad en estudiantes universitarios.

**Metodología:** Este estudio descriptivo transversal estuvo constituido por 1.449 estudiantes universitarios de Turquía. Las medidas antropométricas fueron autoinformadas y los síntomas de trastorno alimentario y prejuicio por obesidad se midieron a través de escalas validadas.

**Resultados:** La prevalencia de estudiantes con bajo riesgo de trastorno alimentario fue del 88,2%, mientras que el 60,3% eran propensos al prejuicio por la obesidad y el 27% tenían prejuicios por la obesidad. Las puntuaciones medias de trastorno alimentario del grupo de bajo peso y peso normal fueron significativamente más bajas que las del grupo con sobrepeso ( $p=0,003$  y  $p=0,019$ , respectivamente). Se encontró que la diferencia entre las puntuaciones medias de prejuicio por la obesidad del grupo de peso normal y el grupo con sobrepeso era significativa ( $p=0,002$ ). Además, en el análisis de regresión lineal múltiple, el grupo con sobrepeso tuvo una asociación significativa con el prejuicio por la obesidad ( $p<0,001$ ).

**Conclusiones:** El riesgo de trastorno alimentario y prejuicio por la obesidad aumenta entre los estudiantes universitarios con sobrepeso/obesidad. La predicción temprana del trastorno alimentario y el prejuicio de la obesidad es crucial para prevenir problemas de salud como la obesidad y enfermedades relacionadas entre los estudiantes universitarios.

#### KEY MESSAGES

1. The risk of eating disorder slightly increased in overweight/obese students.
2. The tendency of obesity bias among students increased in overweight/obese group.
3. Eating disorder risk wasn't associated with obesity prejudice among university students.
4. Risk assessment of eating disorder and obesity prejudice may be helpful in early detection of obesity and related disorders among university students.

#### CITATION

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## INTRODUCTION

Obesity, which is defined as an abnormal or excessive accumulation of fat in the body which may be deleterious to the individual's health, is a global public health problem and increasing more and more<sup>1</sup>. At the same time, obesity is caused by a complex interaction between behavioral, cultural, genetic, physiological, and environmental factors. Although the physiological problems caused by obesity are better known, obesity has been demonstrated to result in weight bias which is identified as negative prejudicial attitudes, beliefs or behaviors towards a person with obesity<sup>2</sup>. Weight bias also refers to stigmatization and discrimination including the attribution of negative stereotypes (e. g., unattractive, lazy, unhealthy) and appearance of negative social attitudes (e. g., teasing, bullying) towards overweight and obese people<sup>3</sup>. These approaches are frequently encountered in areas such as education, business, social interactions and health services. Being exposed to weight bias especially during education period in which young people usually tend to weight related teasing, bullying or stereotyping may cause psychological distress (e. g., stress, anxiety, depression symptoms)<sup>4,5</sup>. In a study determining the obesity prejudice of university students, 55.1% of them were found as prone to be prejudiced, whereas 26.5% of them were prejudiced against obesity. Furthermore, weight bias was observed in underweight, normal and overweight groups regardless of certain weight status<sup>6</sup>.

University students cope with several difficulties leading to stress such as peer pressure, a new environment, academic life, social interaction, financial problems and time management. During this transition to adulthood period, stress may lead to unhealthy nutritional behaviors such as meal skipping, eating fast food and etc.<sup>7</sup>. Furthermore, overweight and obese students who experience stress related weight bias in education period may struggle with drive for thinness, low body image or bulimic symptoms which leads to eating disorders such as anorexia, bulimia or binge eating<sup>8,9</sup>. A study conducted with university students demonstrated that exposure to weight stigma and eating disorder was common among obese students<sup>10</sup>. Moreover, obesity stigmatization of students other than exposure to weight stigma was correlated with eating disorder<sup>11</sup>. It is of great importance that early detection of eating disorders as well as obesity prejudice in young adulthood as such attitudes may result in physically and mentally health

risks such as obesity related metabolic problems, anxiety, depression, insomnia and etc. in adult life<sup>6,12</sup>. However, the relationship of eating disorders and obesity prejudice with body mass index (BMI) among university students still remains unclear.

The purpose of this study is to determine the eating disorders risk and factors associated with obesity prejudice among university students.

## METHODOLOGY

### Participants and procedure

This cross-sectional study was conducted on 1,449 undergraduate students (1,197 female, 252 male) who volunteered to participate in the study between April and November 2019 [Mage (SD) = 22.07 (2.17)], age range 18–40 years. The participants were recruited using convenience sampling from 3 universities located in the northwestern (University of Health Sciences, Trakya University) and the capital (Ankara Yıldırım Beyazıt University) regions of Turkey. The study included 1,637 undergraduate university students and 188 of them whom did not complete the questionnaire were excluded from the study. The criteria for inclusion in this study are being a student at the universities mentioned above and voluntary participation. Also, there wasn't age range criteria for the study.

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the [Ethics Committee of Ankara Yıldırım Beyazıt University (research code 2019-109)]. Written informed consent was obtained from all subjects. The students who participated in the study were not paid for their participation.

### Demographic and obesity related information

The demographic information of the participants, including their gender, age, grade, and diseases related with obesity (gastrointestinal, heart, respiratory, urinary, neurological, and psychological diseases, hypertension, diabetes, and etc.) were self-reported. The following questions were asked to assess the participants' characteristics of obesity: "Do you have a history of obesity in your family members?", "Have you used a method to lose weight and maintain your weight over the past year?".

### Anthropometric measurements

Body weight and height were self-reported by students. Body weight and height were used to calculate the body mass index (BMI) scores [ $\text{BMI} = \text{weight (kg)}/\text{height (m)}^2$ ]. The BMI was categorized according to the WHO classifications as underweight ( $\text{BMI} < 18.5 \text{ kg/m}^2$ ), normal ( $18.5 \leq \text{BMI} \leq 24.9 \text{ kg/m}^2$ ), overweight ( $\text{BMI} \geq 25.0 \text{ kg/m}^2$ ) and obese ( $\text{BMI} \geq 30 \text{ kg/m}^2$ )<sup>13</sup>.

### Obesity prejudice symptoms

The GAMS-27 obesity prejudice scale was used to assess obesity bias. This scale was developed and validated by Ercan *et al.*<sup>14</sup> to measure the obesity bias of students with health education. The sentences completed with *Obese people are...* "Smiling", "Happy", "Self-confident" and etc. are examples of positive items. The sentences completed as examples of negative items are *Obese people are...* "Selfish", "Prone to diseases", "Lazy" and etc. The lowest total score of GAMS-27 is 27 and the highest is 135. As the total score obtained from the scale decreases, individuals are evaluated as being not biased against obesity (see [Supplementary Table S1](#)). On the other hand, as the score increases, individuals are evaluated as having a biased thinking against obesity. Cronbach's alpha coefficient of the scale is 0.85. In the current study, the GAMS-27 demonstrated a high internal consistency (Cronbach's alpha = 0.814).

### Eating disorder symptoms

The Eating Attitude Test-40 (EAT-40) was used to assess eating disorder symptoms, attitude and behavior such as anorexia nervosa. The EAT-40 was developed by Garner and Garfinkel<sup>15</sup> to evaluate disorders in eating attitudes in individuals with and without eating disorders and was adapted to Turkish by Savasir and Erol<sup>16</sup>. The total score ranges from 0 to 120 and the increase in score is associated with an increased risk of eating disorder (see [Supplementary Table S1](#)). The Cronbach's alpha has been shown to range from 0.79 to 0.94<sup>15,16</sup>. In the current study, the EAT-40 demonstrated a high internal consistency (Cronbach's alpha = 0.809).

### Statistical analysis

Qualitative variables were summarized by number and percentage, while quantitative variables were summarized by mean and standard deviation. Comparisons were made with the T-test and variance analysis (ANOVA) in independent groups. LSD (Least Significant Difference) was

preferred as the Post Hoc test in groups with significant ANOVA test results. Chi-square test was used to compare two qualitative groups. Also column proportions were compared with adjusted p statistics using Bonferroni method when the Chi-square test was significant. In the model study, multiple linear regression analysis was performed with the backward method. Before the multiple linear regression analysis, outlier and influential observations were evaluated by the Mahalanobis distance, studentized residuals, and covariance ratio statistics. The data obtained for the study were analyzed with the IBM Statistical Package for the Social Sciences Statistics for Windows (IBM Corp., Version 25.0). Statistical significance level was determined as  $p < 0.05$ .

## RESULTS

A total of 1,449 students participated in the study. Since those who did not complete the questionnaire were excluded from the study, all the participants answered all the questions. The students mostly participated in the study from the departments of Nutrition and Dietetics. A majority of students (28.7%) were 22 years old. Only 15.6% of them had coexistent disease. In addition, 10.1% of students were found as overweighted while 1.5% were obese (Table 1).

The mean EAT-40 score of those who engaged in weight loss practices during the last one year was significantly higher than those who did not ( $p < 0.001$ ). There was a significant difference between the mean EAT-40 scores of the BMI groups ( $p = 0.01$ ). Moreover, the mean EAT-40 scores of the underweight and the normal weight group were significantly lower than the overweight+obese group ( $p = 0.003$  and  $p = 0.019$ , respectively). There was a significant difference between the mean GAMS score of the BMI groups ( $p = 0.003$ ). The difference between the mean GAMS scores of the normal weight group and the overweight+obese group was found to be significant ( $p = 0.002$ ). Although there was a linear increase between EAT-40 scores and the mean BMI groups, the difference between GAMS scores increased departing from the normal weight group (two-sided) (Table 2).

BMI values were higher in male students [ $23.57 (3.03) \text{ kg/m}^2$ ] than female students [ $21.06 (2.85) \text{ kg/m}^2$ ] ( $p < 0.001$ ) while EAT-40 and GAMS scores of male and female students were similar. There was a significant difference

**Table 1.** Sociodemographic Characteristics of University Students (n=1,449).

|                                  | n     | %    |
|----------------------------------|-------|------|
| <b>Department</b>                |       |      |
| Nutrition and Dietetics          | 563   | 38.9 |
| Physiotherapy and Rehabilitation | 228   | 15.7 |
| Nursing                          | 177   | 12.2 |
| Sport Sciences                   | 89    | 6.1  |
| Midwifery                        | 87    | 6.0  |
| Health Management                | 74    | 5.1  |
| Language and Speech Therapy      | 73    | 5.1  |
| Social Work                      | 70    | 4.8  |
| Medicine                         | 48    | 3.3  |
| Child Development                | 40    | 2.8  |
| <b>Grade</b>                     |       |      |
| 1                                | 347   | 23.9 |
| 2                                | 534   | 36.9 |
| 3                                | 418   | 28.9 |
| 4 and above                      | 150   | 10.3 |
| <b>Gender</b>                    |       |      |
| Male                             | 252   | 17.4 |
| Female                           | 1,197 | 82.6 |
| <b>Age</b>                       |       |      |
| 20 and below                     | 253   | 17.5 |
| 21                               | 344   | 23.7 |
| 22                               | 416   | 28.7 |
| 23                               | 247   | 17.1 |
| 24 and above                     | 189   | 13.0 |
| <b>Coexistent disease</b>        |       |      |
| Yes                              | 226   | 15.6 |
| No                               | 1,223 | 84.4 |
| <b>BMI</b>                       |       |      |
| Underweight                      | 217   | 15.0 |
| Normal                           | 1,063 | 73.4 |
| Overweight                       | 146   | 10.1 |
| Obese                            | 23    | 1.5  |

**BMI:** Body mass index.

in terms of grade and age groups according to gender (<0.001). Coexistence of a disease and family history of obesity were similar between male and female students.

Male students who declared to use a method for weight management (33.3%) was lower than female (42.4%) (p=0.009). The prevalence of underweight was more common in female than male students (17.3% and 4%), while overweight+obese prevalence was more common in male than female students (26.6% and 8.5%) (p<0.001). Once the EAT-40 scores of the overall students were categorized, 11.8% of them were found to be at a high risk for disordered eating. The risk estimates of GAMS scores showed that 60.3% of the overall students were prone to being prejudiced against obesity and 27.0% of them were found to be prejudiced. Also, there wasn't a significant difference in terms of EAT-40 and GAMS scores between male and female students (Table 3).

The multiple linear regression analysis was performed with independent variables such as gender, age groups, BMI groups, family history of obesity, EAT-40 score, coexistent disease, and weight loss practices, which were thought to have an effect on the GAMS score (dependent variable) (see [Supplementary Table S2](#)). In the model established with all variables, the model was established with 1,362 observations after removing the outliers and influential observations from the data set. Model/independent variables explained 1% of the variance in the GAMS score (p<0.001). The variable that had significant effect on the GAMS score was the overweight group in terms of BMI (p<0.001) (Table 4).

## DISCUSSION

The aim of present study was to evaluate the eating disorder risk and factors associated with obesity prejudice among university students. The main findings of this study were that overweight/obese students were at increased risk for eating disorder, as well as obesity prejudice. Gender differences weren't observed in terms of eating disorder risk and obesity prejudice. Eating disorder risk, gender, age groups, family history of obesity, coexistent disease and weight loss practices weren't associated with obesity prejudice. Moreover, overweight/obese students tended to be more obesity prejudiced than underweight and normal weight students.

Eating disorders are observed more frequently in women than men among adolescents and young adults<sup>17</sup> although no gender differences was found in the present study. In a study conducted with nursing students, 3.8% of them were reported to be at risk for disordered eating<sup>18</sup>. The results of the current study were similar to those of other studies

**Table 2.** Comparison of Obesity Related Information with Mean EAT-40 and GAMS Scores (n=1,449).

|   | n     | EAT-40***          |       |         | GAMS***              |       |         |
|---|-------|--------------------|-------|---------|----------------------|-------|---------|
|   |       | Mean               | SD    | p       | Mean                 | SD    | p       |
| <b>Do you have a history of obesity in your family members?</b>                           |       |                    |       |         |                      |       |         |
| Yes   | 563   | 17.55              | 11.84 | 0.118*  | 79.53                | 10.72 | 0.522*  |
| No  | 886   | 16.60              | 10.21 |         | 79.16                | 10.52 |         |
| <b>Have you used a method to lose weight and maintain your weight over the past year?</b> |       |                    |       |         |                      |       |         |
| Yes   | 592   | 19.46              | 11.35 | <0.001* | 79.01                | 10.85 | 0.877*  |
| No  | 857   | 15.24              | 10.19 |         | 79.51                | 10.42 |         |
| <b>BMI</b>  |       |                    |       |         |                      |       |         |
| Underweight   | 217   | 15.65 <sup>a</sup> | 8.16  | 0.01**  | 80.22 <sup>a,b</sup> | 10.35 | 0.003** |
| Normal  | 1,063 | 16.91 <sup>a</sup> | 11.31 |         | 78.76 <sup>a</sup>   | 10.40 |         |
| Overweight+obese  | 169   | 19.02 <sup>b</sup> | 10.92 |         | 81.51 <sup>b</sup>   | 11.76 |         |

\*The results of the Independent T-test; \*\*The results of ANOVA.

† Each subscript letter (<sup>a, b</sup>) denotes a subset of BMI categories whose average do not differ significantly from each other at the 0.05 level according to LSD Post-Hoc test.

**GAMS:** Obesity prejudice scale; **EAT-40:** Eating Attitude Test-40; **BMI:** Body Mass Index.

\*\*\***GAMS:** ≤68 unprejudiced; 68.01-84.99 predisposed to prejudice; ≥85 prejudiced.

\*\*\***EAT-40:** ≥30 high risk (abnormal eating attitude); <30 low risk.

as majority of students were at low risk for eating disorder. Apart from gender, obesity, family member with obesity, social environment, body dissatisfaction, and dieting are among important risk factors in the development of eating disorders<sup>19</sup>. Duran reported that the mean eating attitude test scores of students who applied any method for weight gain/loss were higher compared to those who did not use any methods for weight gain/loss<sup>18</sup>. Furthermore, Kadioglu and Ergun stated that students with overweight/obesity were at high risk for eating disorders<sup>20</sup>. A study revealed that students having an obese family member were at higher risk for disordered eating than those who didn't have<sup>21</sup>. On the contrary, in present study having a family member with obesity wasn't stated as a risk for eating disorder. Moreover, using a method to lose weight during the past year and being overweight/obese were determined as risk factors for eating disorders, although all the groups were at low risk for eating disorder. These findings may indicate that overweight/obese students tend to show more anorectic symptoms and more likely to diet frequently due to social environment or psychological distress.

Social circles, family environment, and media have often portrayed ideal man and woman profiles with a lean, aesthetic, and slim appearance in recent years. The pressure of ideal thin of population may result in weight discrimination and weight bias among young adults<sup>22</sup>. Koyu *et al.*<sup>23</sup> reported that 53.6% of university students of health sciences were obesity prejudiced, and 41.1% were prone to be prejudiced against obesity. In this study, students weren't obesity prejudiced and yet a majority of them were prone to obesity prejudice. The examination of other studies in the literature has indicated similar findings with the present study, as gender, and the presence of a family member or relative with obesity/overweight didn't affect the status of bias against obesity<sup>24,25</sup>. Some studies have shown contrary data by reporting that gender (men), and the presence of a family member or relative with obesity/overweight increase obesity bias or tendency to bias<sup>25,26</sup>. It is thought that these differences between studies may have been due to certain reasons such as the use of different scales<sup>27</sup> or dissimilar sample groups<sup>25</sup>. The difference between the percentages of female and male students participating in the studies may

**Table 3.** Demographic and Obesity Related Characteristics, Risk Estimates of EAT-40 and GAMS Scores in Terms of Gender and Overall Students (n=1,449).

|   | Gender |                   |        |                   | p        | n     | Total %       |
|---|--------|-------------------|--------|-------------------|----------|-------|---------------|
|   | Male   |                   | Female |                   |          |       |               |
|   | n      | %                 | n      | %                 |          |       |               |
| <b>Grade</b>  |        |                   |        |                   |          |       |               |
| 1   | 40     | 15.9 <sup>a</sup> | 307    | 25.6 <sup>b</sup> | <0.001** | 347   | 23.9          |
| 2   | 87     | 34.5 <sup>a</sup> | 447    | 37.3 <sup>a</sup> |          | 534   | 36.9          |
| 3   | 79     | 31.3 <sup>a</sup> | 339    | 28.3 <sup>a</sup> |          | 418   | 28.8          |
| 4 and above   | 46     | 18.3 <sup>a</sup> | 104    | 8.7 <sup>b</sup>  |          | 150   | 10.4          |
| <b>Age groups</b>   |        |                   |        |                   |          |       |               |
| 20 and below  | 23     | 9.1 <sup>a</sup>  | 230    | 19.2 <sup>b</sup> | <0.001** | 253   | 17.5          |
| 21  | 50     | 19.8 <sup>a</sup> | 294    | 24.6 <sup>a</sup> |          | 344   | 23.7          |
| 22  | 69     | 27.4 <sup>a</sup> | 347    | 29.0 <sup>a</sup> |          | 416   | 28.7          |
| 23  | 44     | 17.5 <sup>a</sup> | 203    | 17.0 <sup>a</sup> |          | 247   | 17.1          |
| 24 and above  | 66     | 26.2 <sup>a</sup> | 123    | 10.3 <sup>b</sup> |          | 189   | 13.0          |
| <b>Coexistent disease</b>   |        |                   |        |                   |          |       |               |
| Yes   | 30     | 11.9              | 196    | 16.4              | 0.085**  | 226   | 15.6          |
| No  | 222    | 88.1              | 1,001  | 83.6              |          | 1,223 | 84.4          |
| <b>Do you have a history of obesity in your family members?</b>                           |        |                   |        |                   |          |       |               |
| Yes   | 90     | 35.7              | 473    | 39.5              | 0.286**  | 563   | 38.9          |
| No  | 162    | 64.3              | 724    | 60.5              |          | 886   | 61.1          |
| <b>Have you used a method to lose weight and maintain your weight over the past year?</b> |        |                   |        |                   |          |       |               |
| Yes   | 84     | 33.3              | 508    | 42.4              | 0.009**  | 592   | 40.9          |
| No  | 168    | 66.7              | 689    | 57.6              |          | 857   | 59.1          |
| <b>BMI</b>  |        |                   |        |                   |          |       |               |
| Mean (SD)   | 252    | 23.57 (3.03)      | 1,197  | 21.06 (2.85)      | <0.001*  | 1,449 | 21.49 (3.04)  |
| Underweight   | 10     | 4.0 <sup>a</sup>  | 207    | 17.3 <sup>b</sup> | <0.001** | 217   | 15.0          |
| Normal  | 175    | 69.4 <sup>a</sup> | 888    | 74.2 <sup>a</sup> |          | 1,063 | 73.4          |
| Overweight+obese  | 67     | 26.6 <sup>a</sup> | 102    | 8.5 <sup>b</sup>  |          | 169   | 11.6          |
| <b>EAT-40</b>   |        |                   |        |                   |          |       |               |
| Mean (SD)   | 252    | 18.13 (12.35)     | 1,197  | 16.72 (10.53)     | 0.093*   | 1,449 | 16.97 (10.88) |
| Low risk  | 216    | 85.7              | 1,062  | 88.7              | 0.179**  | 1,278 | 88.2          |
| High risk   | 36     | 14.3              | 135    | 11.3              |          | 171   | 11.8          |
| <b>GAMS</b>   |        |                   |        |                   |          |       |               |
| Mean (SD)   | 252    | 79.13 (11.88)     | 1,197  | 79.34 (10.31)     | 0.773*   | 1,449 | 79.30 (10.60) |
| Unprejudiced  | 32     | 12.7              | 152    | 12.7              | 0.982**  | 184   | 12.7          |
| Prone to be prejudiced  | 153    | 60.7              | 720    | 60.2              |          | 873   | 60.3          |
| Prejudiced  | 67     | 26.6              | 325    | 27.1              |          | 392   | 27.0          |

\*The results of the Independent T-test; \*\*The results of the Pearson Chi-square (Exact p).

† Each subscript letter (<sup>a, b</sup>) denotes a subset of gender categories whose column within gender proportions do not differ significantly from each other at the 0.05 level.

GAMS: Obesity prejudice scale; EAT-40: Eating Attitude Test-40.

**Table 4.** Multiple Linear Regression Analysis to Estimate the Effect of BMI on The GAMS Score (n=1,362).

|                               | Unstandardized Coefficients |       | Standardized Coefficients | Sig.   | 95.0% Confidence Interval for B |             |
|-------------------------------|-----------------------------|-------|---------------------------|--------|---------------------------------|-------------|
|                               | B                           | SH    | B                         |        | Lower Bound                     | Upper Bound |
| <b>(Constant)</b>             | 78.593                      | 0.250 | -                         | <0.001 | 78.102                          | 79.083      |
| <b>BMI (Overweight+obese)</b> | 2.776                       | 0.748 | 0.100                     | <0.001 | 1.308                           | 4.244       |

n: 1,362; R: 0.100; R-square: 0.010; Adj-R-square: 0.009; s: 8.695, (F=13.761, p<0.001).

\*Variables used in the first step: Gender, age groups, BMI groups, family history of obesity, EAT-40 score, coexistent disease and weight loss practices which were thought to have an effect on GAMS scores (the dependent variable).

**GAMS:** Obesity prejudice scale; **EAT-40:** Eating Attitude Test-40; **BMI:** Body Mass Index.

contribute to the relationship between gender and obesity bias to be inconsistent<sup>25</sup>. The present study revealed that gender differences didn't exist among students in terms of obesity prejudice which may be a result of sample size of the compared groups.

Weight bias may also occur in stigmatized individuals other than gender and sociocultural factors and appears not only in overweight/obese individuals but also people in underweight and normal weight<sup>8</sup>. In a study conducted with the participation of 756 university students, the students with obesity were found to have lower bias levels compared to the students with normal/low weight, and a positive correlation was found between seeing oneself overweight and bias against obesity<sup>23</sup>. In contrast to this, Yildiz, Yalcinoz and Baysal observed that the level of obesity bias increased with an increase in BMI levels<sup>25</sup>. Similar to this study, present study demonstrated that obesity prejudice tended to increase in overweight/obese students. The results may be explained as overweight/obese students were more vulnerable to weight bias against themselves.

Irregular eating disorder behaviors are commonly seen in overweight/obese individuals who meet with negative attitudes and behaviors towards body weight in all areas of life and develop prejudices against themselves. Studies have shown that internalized body weight stigmatization is associated with disordered eating as a result of the previously experienced excess body weight<sup>28,29</sup>. A study conducted with university students reported that eating disorders are associated with psychological distress, internalized weight bias, and weight stigma. In a similar study involving 420 female university students, a positive correlation was observed between internalized weight bias and eating disorders<sup>30</sup>. However eating disorder risk in terms of anorexia nervosa and obesity prejudice weren't associated

in this study which may represent university students had poor eating behavior other than anorexia nervosa.

An unbalanced distribution of male and female students, which may affect the relationship between gender, obesity bias, and eating attitude, was the first limitation of the study. Secondly, most of the participants were recruited from nutrition and dietetics students. In addition, body weight and height were self-reported by participants. Also, obesity-related characteristics (presence of obesity in family and using a weight loss method) were not evaluated in validated methods. Lastly, eating disorder risk was screened only by symptoms of anorexia nervosa. The strengths of this study were that the study was multi-centered and had a large sample group. In addition, this study is one of the limited number of studies that evaluates the obesity bias with GAMS scale at local and international levels in Turkey and has the potential to contribute to future studies on this topic. Finally, validated scales such as EAT-40 and GAMS were used.

## CONCLUSIONS

The risk of eating disorder and obesity prejudice increases among overweight/obese university students. Early detection of eating disorders and weight bias in young adults prevent health problems such as obesity and related metabolic diseases. In the light of the current results, it is crucial that necessary steps to be taken to reduce students' eating disorder risk and obesity bias especially in overweight/obese individuals. For this purpose, the obesity phenomenon should be taught in health sciences students with its medical, social,

and psychological aspects, and students should be helped to understand obesity, eating disorders, and obesity bias closely using video, interview, and drama methods. If necessary, students should be guided to receive psychological and nutritional interventions. Recommendations can be made on more studies investigating eating disorders, such as bulimia nervosa or binge eating and obesity prejudice relationship with body mass index.

### AUTHORS' CONTRIBUTIONS

NEA designed the study. NEA, AY, LTP, REK and ZNB performed the data collection. NEA, REK and ZNB provided data management. All authors discussed the interpretation of the results and read and approved the final manuscript.

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### COMPETING INTERESTS

The authors state that there are no conflicts of interest in preparing the manuscript.

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