Evaluation of food literacy and eating disorders and related factors in university students

Üniversite öğrencilerinde gıda okuryazarlığı ile yeme bozukluğunun ve ilişkili faktörlerin değerlendirilmesi

Özlem ARIK[1], İnci ARIKAN[2]

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1-Necmettin Erbakan University, Faculty of Medicine, Department of Biostatistics and Medical Informatics, Konya, Türkiye.

2-Kütahya Health Sciences University, Faculty of Medicine, Department of Public Health, Kütahya, Türkiye.

Sorumlu Yazar / Corresponding Author: Özlem ARIK, Assistant Professor

e-posta / e-mail: ozlmarik88@gmail.com

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Abstract

The university student period is of great importance as it is easier to exhibit risky behaviors such as unhealthy eating. The aim of this study is to assess the food literacy and eating disorders of university students to contribute to the planning of remedial interventions. This study was conducted with 813 students from Kütahya Health Sciences University, in 2022. Data were collected through a survey form. Factors associated with food literacy and eating disorders were demonstrated using chi-square tests and binary logistic regression analysis. Food literacy was found to be more inadequate/limited in men, younger individuals, those who perceive themselves as weak, those who do not prioritize healthy eating, those who consume less than five servings of fruits, vegetables, legumes, and grains (excluding potatoes and corn), and those who consume more than 50 grams of sugar daily. Eating disorders were more common among those who perceive themselves as overweight or normal weight, those who do not eat regularly, those who restrict their eating to stay thin or maintain an ideal weight, those with fast food habits, those whose food intake varies with emotions, and those with lower BMI and associate degree education. In order for university students, who are the future of the country, to acquire healthy eating habits, we think that planning remedial interventions such as the inclusion of healthy nutrition in educational curricula and various activities, regulations in the nutrition facilities of universities and dormitories, and in the amount of loans/scholarships given will have a positive effect.

Keywords: Food literacy, eating disorders, nutrition, university, student

Özet

Üniversite öğrencilik dönemi sağlıksız beslenme gibi riskli davranışları sergilemenin daha kolay olması nedeniyle büyük önem taşımaktadır. Bu çalışmanın amacı üniversite öğrencilerinin gıda okuryazarlığını ve yeme bozukluklarını değerlendirerek iyileştirici müdahalelerin planlanmasına katkıda bulunmaktır. Bu çalışma 2022 yılında Kütahya Sağlık Bilimleri Üniversitesi'nde öğrenim gören 813 öğrenci ile yürütülmüştür. Veriler anket formu aracılığıyla toplanmıştır. Gıda okuryazarlığı ve yeme bozuklukları ile ilişkili faktörler ki-kare testi ve ikili lojistik regresyon analizi kullanılarak gösterilmiştir. Gıda okuryazarlığının erkeklerde, genç bireylerde, kendini zayıf algılayanlarda, sağlıklı beslenmeyi önceliklendirmeyenlerde, günde beş porsiyondan az meyve, sebze, bakliyat ve tahıl (patates ve mısır hariç) tüketenlerde ve günde 50 gramdan fazla şeker tüketenlerde daha yetersiz/sınırlı olduğu bulunmuştur. Kendini kilolu veya normal kiloda algılayanlarda, düzenli beslenmeyenlerde, zayıf kalmak veya ideal kilosunu korumak için beslenmesini kısıtlayanlarda, fast food alışkanlığı olanlarda, besin alımı duygulara göre değişenlerde, düşük beden kitle indeksine sahip ve ön lisans eğitim düzeyinde olanlarda yeme bozukluğu daha sık görülmüştür. Ülkenin geleceği olan üniversite öğrencilerinin sağlıklı beslenme alışkanlıkları edinmeleri için; sağlıklı beslenmenin eğitim müfredatlarına ve çeşitli etkinliklere dahil edilmesi, üniversite ve yurtların beslenme tesislerinde, verilen kredi/burs miktarlarında düzenlemeler yapılması gibi düzeltici müdahalelerin planlanmasının olumlu etki yaratacağını düşünmekteyiz.

Anahtar Kelimeler: Gıda okuryazarlığı, yeme bozukluğu, beslenme, üniversite, öğrenci

Introduction

Nutrition refers to the consumption of essential nutrients at appropriate times and in sufficient amounts to maintain health and prevent negative impacts on quality of life (1). Globally, particularly in developing countries, under-nutrition and over-nutrition are inevitable outcomes of malnutrition. According to the 2013 Global Nutrition Report by the World Health Organization, nearly half of the population is either overweight, obese, or underweight, with obesity being more prevalent among women than men (2-5). While some individuals follow proper dietary guidelines, others engage in food restriction and disordered eating behaviors that may harm their health (6).

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), eating and nutrition disorders involve abnormal food consumption and disrupted eating behaviors that negatively affect physical and psychosocial health. Individuals with eating disorders are often distressed about their weight and appearance. Even if classified as normal or underweight based on body mass index (BMI), they may perceive themselves as overweight. They may either constantly strive for thinness or struggle with uncontrollable eating (7). Despite the high prevalence of such disorders, they are often underrecognized within healthcare systems (8).

Quality nutrition, defined as balanced intake of various nutrients without disordered eating, supports overall health and helps prevent numerous public health issues (9). Both overnutrition and inadequate or improper nutrition contribute significantly to noncommunicable diseases such as diabetes, cardiovascular diseases, obesity, and cancer. Among the factors influencing a healthy lifestyle, nutritional behavior plays a key role, and recent studies have highlighted a link between healthy food consumption and food literacy (10).

Food literacy refers to one's ability to understand food preparation, make appropriate food choices, and recognize how food affects the body. It extends beyond basic nutrition knowledge, involving practical abilities such as interpreting food labels, meal planning, and evaluating the nutritional value of foods. The growing variety of food products and the increasing tendency to eat outside the home have made food and nutrition literacy more critical (11,12). Identifying, assessing, and understanding individuals' food literacy levels are essential for public health improvements and targeted interventions (11). Such interventions should be regionally planned and supervised by both health and local authorities, considering age groups and sociodemographic characteristics. High levels of food literacy is necessary for making informed decisions about what and how much to eat (12, 13).

Evaluating the prevalence of disordered eating and food literacy across different age groups is crucial for managing risk factors that threaten public health (13). During young adulthood, rapid growth increases nutritional needs, and without adequate and balanced intake, development may be hindered. Failure to establish healthy eating habits at this stage raises the risk of future diseases such as cardiovascular disorders, obesity, diabetes, hypertension, and cancer. Behavioral changes in adolescence can also disrupt healthy habits formed earlier in life (1, 14). Many young individuals leave home for the first time to attend university, and the social, emotional, and environmental adjustments they face often lead to abandoning healthy eating patterns (1, 14, 15). This study aims to assess food literacy and eating disorders

ORCID:
Özlem ARIK:
0000-0002-9427-3733
İnci ARIKAN:
0000-0001-5060-7722

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among university students and to identify related risk factors. The findings are expected to guide the development of effective interventions.

Material and Method

This cross-sectional study was conducted between April 25 and June 25, 2022, involving undergraduate and associate degree students from various faculties and vocational schools of Kütahya Health Sciences University. Ethical approval was obtained from the Non-Interventional Clinical Research Ethics Committee of Kütahya Health Sciences University (KHSU) (Approval No: 2022/05-17, 20.04.2022). The study adhered to the ethical standards outlined in the Declaration of Helsinki, last updated at the 64th WMA General Assembly in 2013.

The study population comprised 4311 students. To achieve at least 80% statistical power, the minimum required sample size was calculated as 527, based on a 95% confidence level, 5% significance level, 4% margin of error, and 50% estimated prevalence. A total of 813 students participated, surpassing the required power. The study included healthy, voluntary KHSU associate and undergraduate students aged 18 and older. The minimum sample size was calculated a priori based on a cross-sectional study design, assuming a medium effect size, a statistical power of 80%, a significance level (α) of 0.05, and an expected prevalence of 50%, which is commonly used when the true prevalence is unknown and provides the maximum sample size. The sample size estimation was performed according to the Cochran formula for population proportions. Based on these assumptions, the minimum required sample size was calculated as 527 participants. The final sample size of 813 students exceeded this requirement, ensuring adequate statistical power for the analyses.

The questionnaire was designed by the researchers using Google Forms and distributed via social media (WhatsApp Messenger). The form took approximately 10 minutes to complete and included 43 questions divided into five sections: sociodemographic data, nutritional characteristics and status, ideal nutrition criteria, the Food Literacy Short Form Scale, and the Rezzy Eating Disorders Scale.

Data Collection Process: Data were collected online between April 25 and June 25, 2022, using Google Forms. Before starting the questionnaire, participants were presented with an information page explaining the study's objectives, confidentiality, and voluntary participation, and electronic informed consent was obtained. The form could be completed only once per participant (via Google account restriction), and incomplete or inconsistent responses were excluded before analysis. The questionnaire link was distributed through university e-mails, WhatsApp Messenger class groups, and social media platforms of the faculties to reach a wide range of students. The total data collection period lasted approximately eight weeks, during which 813 valid responses were obtained, corresponding to a response rate of about 18.9%. The form took approximately 10–12 minutes to complete.

The questionnaire consisted of 43 questions divided into five sections: sociodemographic data, nutritional characteristics and status, ideal nutrition criteria, the Food Literacy Short Form Scale, and the Rezzy Eating Disorders Scale.

Food Literacy Short Form Scale: Developed by Krause et al. (11), the scale has a Cronbach alpha of 0.82 and consists of 12 items rated on a four- or five-point Likert scale, measuring a single dimension of food literacy. Scores range from 7 to 52, with higher values indicating better literacy. The Turkish adaptation by Durmuş et al. (12) in 2019 yielded a Cronbach alpha of 0.80. Gökler et al. (13) determined the cut-off point: scores ≥31 indicate adequate/excellent food literacy, while <31 reflect inadequate/limited literacy.

Rezzy Eating Disorders Scale: Developed by Morgan et al. (16) in 1999 and adapted into Turkish by Aydemir et al. (8), the scale consists of a single factor with five items. Responses are given as 'Yes' or 'No', with each 'Yes' scored as 1 point. A total score of ≥2 indicates the presence of an eating disorder. The scale's Cronbach alpha was calculated as 0.74.

In the analysis, categorical levels of food literacy and Rezzy Eating Disorder Scale scores were treated as dependent variables. Sociodemographic data, nutritional characteristics, and ideal nutrition criteria were considered as independent variables. IBM SPSS (Statistical Package for Social Sciences) Statistics 29 program was used for statistical evaluation of the data obtained as a result of the research conducted on associate degree and undergraduate students within the scope of KHSU. For numerical variables, descriptive statistics were used, which included the minimum, maximum, mean and standard deviation values. For descriptive values of other categorical variables, frequency tables with number (n) and percentage (%) values were used. The Food Literacy Short Form Scale was evaluated in two categories as "*adequate/excellent and inadequate/limited*" and the Rezzy Eating Disorders Scale was evaluated in two categories as "*at risk for eating disorders and no risk for eating disorders*". To examine the differences between the categories of numerical variables, the Kolmogorov-Smirnov test was first used to check whether they were normally distributed and then the Independent Samples-T Test was used. Crosstabs and chi-square (χ^2) test statistics were used to examine the associations of university students' food literacy and eating disorder status with sociodemographic characteristics, nutritional characteristics and status information and ideal nutrition criteria, respectively. As a result of the chi-square (χ^2) tests, all variables with a p-value less than 0.25 were included in the logistic regression analysis as possible risk factors (17). Factors affecting food literacy and eating disorders were determined by binary logistic regression analysis (forward: conditional method). Risk coefficient interpretations were made through the odds ratios (OR) obtained through the analysis. Statistical significance was accepted for $p<0.001$, $p<0.05$, $p<0.10$ values, respectively. In other words, confidence levels of 0.999, 0.95 and 0.90 were accepted for statistical significance.

Results

Sociodemographic characteristics of 813 university students were obtained. The mean age was 20.52±1.90 years, with 25% male and 75% female participants. Of these, 56.9% were undergraduate and 43.1% were associate degree students, mostly from health-related departments such as medicine and dentistry. For 44.8% of students, income equaled expenses, while 12.4% reported income exceeding expenses. A total of 59% lived in the city center. Dormitories housed 61.4% of the students, while 20.3% lived in apartments. Regarding parental education, 65.7% of mothers and 49% of fathers had completed primary or secondary school education. The mean score on the Food Literacy Scale was 32.73±6.26, while the Rezzy Eating Disorders Scale averaged 1.19±1.13. Food literacy was classified as adequate/excellent in 64% of students and inadequate/limited in 36%. Regarding eating disorders, 61.3% were not at risk, while 38.7% were identified as at risk. Table 1 presents the associations between students' food literacy, eating disorder status, and sociodemographic characteristics. Food literacy showed a statistically significant relationship with gender (χ^2=2.758; p=0.097) and department of study (χ^2=6.783; p=0.034). A significant difference was also observed by age (t=11.956; p<0.001). Additionally, gender was significantly associated with eating disorders (χ^2=10.685; p=0.001), (Table 1).

Table 1: The relationships between university students' food literacy and eating disorder status with sociodemographic characteristics

Variables	Categories	Food Literacy			Eating Disorders		
		Adequate / Excellent n (%)	Insufficient / Limited n (%)	χ^2 p-value	No n (%)	Yes n (%)	χ^2 p-value
Gender	Male	120 (59.1)	83 (40.9)	2.75 0.097 ***	144 (70.9)	59 (29.1)	10.685 0.001 *
	Female	400 (65.6)	210 (34.4)		354 (58.0)	256 (42.0)	

Income status	Income less expenses	213 (61.2)	135 (38.8)	2.027 0.363	200 (57.5)	148 (42.5)	4.066 0.131
	Income more expenses	66 (65.3)	35 (34.7)		62 (61.4)	39 (38.6)	
	Income equals expenses	241 (66.2)	123 (33.8)		236 (64.8)	128 (35.2)	
Place of residence	District	212 (63.7)	121 (36.3)	0.022 0.883	195 (58.6)	138 (41.4)	1.727 0.189
	Central	308 (64.2)	172 (35.8)		303 (63.1)	177 (36.9)	
Place of accommodation	At home with my family	104 (69.8)	45 (30.2)	3.805 0.149	99 (66.4)	50 (33.6)	2.869 0.238
	In an apartment	109 (66.1)	56 (33.9)		104 (63.0)	61 (37.0)	
	In the dormitory	307 (61.5)	192 (38.5)		295 (59.1)	204 (40.9)	
Mother's education status	Primary/Secondary school	342 (64.0)	192 (36.0)	0.292 0.864	328 (61.4)	206 (38.6)	1.556 0.459
	High school	87 (65.4)	46 (34.6)		76 (57.1)	57 (42.9)	
	University	91 (62.3)	55 (37.7)		94 (64.4)	52 (35.6)	
Father's education status	Primary/Secondary school	264 (66.3)	134 (33.7)	2.444 0.295	250 (62.8)	148 (37.2)	0.954 0.621
	High school	113 (59.8)	76 (40.2)		111 (58.7)	78 (41.3)	
	University	143 (63.3)	83 (36.7)		137 (60.6)	89 (39.4)	
Education level	Under graduate	288 (62.2)	175 (37.8)	1.441 0.230	294 (63.5)	169 (36.5)	2.282 0.131
	Associate degree	232 (66.3)	118 (33.7)		204 (58.3)	146 (41.7)	
Department of study	Faculty of medicine	179 (63.5)	103 (36.5)	6.783 0.034 **	181 (64.2)	101 (35.8)	2.554 0.279
	Faculty of dentistry	50 (52.6)	45 (47.4)		61 (64.2)	34 (35.8)	
	Other	291 (66.7)	145 (33.3)		256 (58.7)	180 (41.3)	

	Mean ± SD	Mean ± SD	t p-value	Mean ± SD	Mean ± SD	t p-value
Age	20.71 ± 2.01	20.16 ± 1.60	11.956 <0.001*	20.58 ± 1.92	20.40 ± 1.84	0.917 0.176

*Categorical variables are given as n(%) and Chi-Square (χ^2) test is used. Numerical variables are given as Mean±SD and Independent Samples-T Test is used. SD: Standard Deviation, n: number, %: percent, *:p<0.001, **:p<0.05, ***:p<0.10*

When nutritional characteristics and status information were evaluated, 87% of 813 university students with a mean BMI (kg/m2) of 22.324 ± 3.636 did not have a disease that required regular medication use. The rate of those who considered themselves thin was 15.3% and 22% considered themselves overweight. It was observed that 81.2% of university students did not engage in regular physical activity or sports and 53% did not pay attention to the nutritional quality of the foods they consumed. While 37.5% of the students did not eat regularly, 58.3% did not make any restrictions to stay thin or at an ideal weight. The rate of students who had the habit of consuming fast food was 67.3%. In addition, 83% of the students changed the amount they ate according to their emotions such as sadness or happiness. It was observed that 20.9% of the students smoked and 17.1% consumed alcohol. The relationships between food literacy and eating disorder status of university students and their nutritional characteristics and status information are given in Table 2. There was a statistically significant relationship between food literacy and self-perception, paying attention to healthy eating, eating meals regularly and restricting food intake to stay thin or reach ideal weight. (Respectively: χ^2=18.753; p<0.001, χ^2=32.034; p<0.001, χ^2=8.287; p=0.004, χ^2=8.933; p=0.003), (Table 2). A statistically significant relationship was found between eating disorders with having a disease requiring regular medication, self-perception, eating meals regularly, restricting food intake to stay thin or reach ideal weight, fast food consumption habit, changes in the amount of food according to emotions and alcohol consumption. (Respectively: χ^2=3.645; p=0.037, χ^2=98.694; p<0.001, χ^2=6.260; p=0.012, χ^2=54.697; p<0.001, χ^2=24.203; p<0.001, χ^2=34.139; p<0.001, χ^2=6.317; p=0.012), (Table 2).

Regarding BMI, the mean value was 22.32 ± 3.64. When compared across eating disorder categories, a statistically significant difference was observed at the 10% level (t=1.964; p=0.083). These results indicate that students at risk of eating disorders tended to have higher BMI values.

Table 2: The relationship between university students' food literacy and eating disorders status with nutritional characteristics and situation information

Variables	Categories	Food Literacy			Eating Disorders		
		Adequate / Excellent n (%)	Insufficient / Limited n (%)	χ^2 p-value	No n (%)	Yes n (%)	χ^2 p-value
A disease requiring regular medication	Yes	61 (57.5)	45 (42.5)	2.175 0.140	56 (52.8)	50 (47.2)	3.645 0.037 **
	No	459 (64.9)	248 (35.1)		442 (62.5)	265 (37.5)	

Self-perception	Overweight	107 (59.8)	72 (40.2)	18.753 <0.001 *	62 (34.6)	117 (65.4)	98.694 <0.001 *
	Normal	352 (69.0)	158 (31.0)		324 (63.5)	186 (36.5)	
	Thin	61 (49.2)	63 (50.8)		112 (90.3)	12 (9.7)	
Regular exercise/physical activity	Yes	105 (68.6)	48 (31.4)	1.781 0.182	88 (57.5)	65 (42.5)	1.110 0.292
	No	415 (62.9)	245 (37.1)		410 (62.1)	250 (37.9)	
Paying attention to healthy eating	Yes	283 (74.1)	99 (25.9)	32.034 <0.001 *	245 (64.1)	137 (35.9)	2.521 0.112
	No	237 (55.0)	194 (45.0)		253 (58.7)	178 (41.3)	
Eating meals regularly	Yes	344 (67.7)	164 (32.3)	8.287 0.004 **	328 (64.6)	180 (35.4)	6.260 0.012 **
	No	176 (57.7)	129 (42.3)		170 (55.7)	135 (44.3)	
Restricting food intake to stay thin or reach ideal weight	Yes	237 (69.9)	102 (30.1)	8.933 0.003 **	157 (46.3)	182 (53.7)	54.697 <0.001 *
	No	283 (59.7)	191 (40.3)		341 (71.9)	133 (28.1)	
Fast food consumption habit	Yes	340 (62.2)	207 (37.8)	2.359 0.125	303 (55.4)	244 (44.6)	24.203 <0.001 *
	No	180 (67.7)	86 (32.3)		195 (73.3)	71 (26.7)	
Changes in the amount of food according to emotions (such as sadness or happiness)	Yes	430 (63.7)	245 (36.3)	0.114 0.736	383 (56.7)	292 (43.3)	34.139 <0.001 *
	No	90 (65.2)	48 (34.8)		115 (83.3)	23 (16.7)	
Smoking	Yes	102 (60.0)	68 (40.0)	1.463 0.226	95 (55.9)	75 (44.1)	2.614 0.106
	No	418 (65.0)	225 (35.0)		403 (62.7)	240 (37.3)	
Alcohol consumption	Yes	82 (59.0)	57 (41.0)	1.795 0.180	72 (51.8)	67 (48.2)	6.317 0.012 **
	No	438 (65.0)	236 (35.0)		426 (63.2)	248 (36.8)	

*Categorical variables are given as n(%) and Chi-Square (χ^2) test is used. n: number, %: percent, *:p<0.001, **:p<0.05*

Regarding ideal nutrition criteria, 81.4% of students consumed fewer than five servings of fruits, vegetables, legumes, and cereals (excluding potatoes and corn), and 38.4% consumed more than 50 g of sugar daily. Additionally, 79.5% consumed less than 500 g of red and white meat (excluding processed meats), and 47.5% exceeded one teaspoon of iodized salt per day. As for oil preferences, 32% used more than one type, 30.4% preferred sunflower oil, and 22.9% olive oil. Table

3 presents the relationships between these criteria and both food literacy and eating disorder status. Significant associations were found between food literacy and daily intake of fruits/vegetables/legumes/cereals, sugar, and type of oil used (χ^2=8.389, p=0.004; χ^2=8.630, p=0.003; χ^2=21.582, p<0.001), (Table 3).

Table 3: The relationship between university students' food literacy and eating disorder status with ideal nutrition criteria

Variables	Categories	Food Literacy			Eating Disorders		
		Adequate/ Excellent n (%)	Insufficient/ Limited n (%)	χ^2 p-value	No n (%)	Yes n (%)	χ^2 p-value
The ideal daily consumption of fruits, vegetables, legumes, and grains excluding potatoes and corn is 5 servings	5 servings and more	112 (74.2)	39 (25.8)	8.389 0.004 **	97 (64.2)	54 (35.8)	0.696 0.404
	Less than 5 servings	408 (61.6)	254 (38.4)		401 (60.6)	261 (39.4)	
The ideal daily sugar consumption is less than 50 grams	Less than 50 g	340 (67.9)	161 (32.1)	8.630 0.003 **	317 (63.3)	184 (36.7)	2.242 0.134
	More than 50 g	180 (57.7)	132 (42.3)		181 (58.0)	131 (42.0)	
The ideal weekly consumption of red and white meat, excluding processed meats like salami and sausages is less than 500 grams	Less than 500 g	415 (64.2)	231 (35.8)	0.108 0.743	396 (61.3)	250 (38.7)	0.003 0.958
	More than 500 g	105 (62.9)	62 (37.1)		102 (61.1)	65 (38.9)	
The ideal daily consumption of iodized salt is approximately 1 teaspoon	Less than 1 teaspoon	282 (66.0)	145 (34.0)	1.690 0.194	271 (63.5)	156 (36.5)	1.853 0.173
	More than 1 teaspoon	238 (61.7)	148 (38.3)		227 (58.8)	159 (41.2)	
It is ideal for daily fat consumption not to exceed 30% of total daily calories, and unsaturated fats should be preferred over saturated fats	Sunflower oil	152 (61.5)	95 (38.5)	21.582 <0.001 *	162 (65.6)	85 (34.4)	5.463 0.243
	More than one type of oil	158 (60.8)	102 (39.2)		157 (60.4)	103 (39.6)	
	Margarine	16 (44.4)	20 (55.6)		24 (66.7)	12 (33.3)	
	Butter	51 (60.7)	33 (39.3)		44 (52.4)	40 (47.6)	
	Olive oil	143 (76.9)	43 (23.1)		111 (59.7)	75 (40.3)	

*Categorical variables are given as n(%) and Chi-Square (χ^2) test is used. n: number, %: percent, *:p<0.001, **:p<0.05*

Table 4 shows that gender, age, self-perception, paying attention to healthy eating, ideal daily consumption of fruits, vegetables, legumes, and grains (excluding potatoes and corn), and ideal daily consumption of sugar have significant and statistically meaningful effects on food literacy. Interpretations were made using OR regarding the risk of inadequate/limited food literacy. With each one-unit increase in age, the likelihood of having inadequate/limited food literacy decreases significantly, with the risk being reduced by approximately 16.4% as age increases (p<0.001). The risk of inadequate/limited food literacy was found to be 1.459 times higher in males compared to females, 1.698 times higher in those who perceive themselves as thin compared to those who perceive themselves as overweight, and 2.043 times higher in individuals who do not pay attention to healthy eating compared to those who do. (Respectively: p=0.034, p=0.032, p<0.001), (Table 4). Additionally, the risk of inadequate/limited food literacy was 1.921 times higher in individuals who consume less than 5 servings daily of fruits, vegetables, legumes, and grains excluding potatoes and corn compared to those who consume 5 servings or more (p=0.003). It was also 1.472 times higher in individuals who consume more than 50 g of sugar daily compared to those who consume 50 g or less (p=0.015), (Table 4).

Table 4: Analysis of factors associated with food literacy by binary logistic regression (forward method)

Forward Method	B	SE	Wald	p-value	Odds Ratio (OR) Exp(B)	95% CI for OR Lower Upper
+Female Gender (Male)	0.378	0.178	4.509	0.034**	1.459	1.030 2.069
Age	-0.179	0.047	14.288	<0.001*	0.836	0.762 0.917
+Overweight Self-perception (Normal)	-0.277	0.189	2.153	0.142	0.758	0.524 1.098
+Overweight Self-perception (Thin)	0.529	0.247	4.608	0.032**	1.698	1.047 2.752
+Yes Paying attention to healthy eating (No)	0.714	0.158	20.414	<0.001*	2.043	1.498 2.785
+5 servings or more ideal consumption of fruits, vegetables, legumes and grains other than potatoes and corn (Less than 5 servings)	0.653	0.216	9.113	0.003**	1.921	1.257 2.935
+Less than 50 g Ideal daily sugar consumption (More than 50 g)	0.387	0.159	5.937	0.015**	1.472	1.079 2.009
Constant	1.974	0.988	3.996	0.046**	7.202	
Dependent Variable: Food Literacy: Adequate/Excellent - Insufficient/Limited						

+: Reference Category, SE: Standart Error, df: degrees of freedom, Exp: Exponential, CI: Confidence Interval,
**: p<0.001, **: p<0.05*

Table 5 shows that self-perception, eating meals regularly, restricting food intake to stay thin or reach ideal weight, fast food consumption habit, changes in the amount of food according to emotions, BMI, and education level have significant and statistically meaningful effects on eating disorders. Interpretations were made using OR regarding the risk of having an eating disorder. The risk of having an eating disorder was found to be 13.805 times higher in individuals who perceive themselves as overweight compared to those who perceive themselves as thin, 4.990 times higher in individuals who perceive themselves as normal weight compared to those who perceive themselves as thin, 1.516 times higher in individuals who do not eat regularly compared to those who eat meals regularly, 2.792 times higher in individuals who restrict their food intake to stay thin or reach ideal weight compared to those who do not restrict, 2.143 times higher in individuals with fast food consumption habit compared to those without, and 3.247 times higher in individuals who experience changes in the amount they eat based on emotions compared to those who do not (Respectively: $p<0.001$, $p<0.001$, $p=0.017$, $p<0.001$, $p<0.001$, $p<0.001$), (Table 5). In addition, the risk of having an eating disorder was 1.471 times higher in those with an associate's degree compared to those with an undergraduate degree ($p=0.023$). For each one-unit increase in BMI, the likelihood of the outcome decreases significantly by approximately 5.3% ($p=0.019$) (Table 5).

Table 5: Analysis of factors associated with eating disorders by binary logistic regression (forward method)

Forward Method	B	SE	Wald	p-value	Odds Ratio (OR) Exp(B)	95% CI for OR Lower Upper
+Thin Self-perception (Overweight)	2.625	0.356	54.232	<0.001*	13.805	6.865 27.762
+Thin Self-perception (Normal)	1.607	0.331	23.524	<0.001*	4.990	2.606 9.553
+Yes Eating meals regularly (No)	0.416	0.174	5.747	0.017**	1.516	1.079 2.131
+No Restricting food intake to stay thin or reach ideal weight (Yes)	1.027	0.169	37.034	<0.001*	2.792	2.006 3.886
+No Fast food consumption habit (Yes)	0.762	0.185	17.019	<0.001*	2.143	1.492 3.079
+No Changes in the amount of food according to emotions (such as sadness or happiness) (Yes)	1.178	0.261	20.284	<0.001*	3.247	1.945 5.420
BMI (kg/m^2)	-0.054	0.023	5.536	0.019**	0.947	0.905 0.991

+Undergraduate Education level (Associate degree)	0.386	0.169	5.197	0.023**	1.471	1.056 2.050
Constant	-3.250	0.655	24.602	<0.001*	0.039	-3.250 0.655
Dependent Variable: Eating Disorders: No-Yes						

*+: Reference Category, SE: Standart Error, df: degrees of freedom, Exp: Exponential, CI: Confidence Interval, *:p<0.001, **: p<0.05*

Discussion

This study evaluated food literacy, eating disorders, and their associated factors among university students. The findings revealed that 64% of students had adequate/excellent food literacy, while 36% had inadequate/limited food literacy. In addition, 38.7% of the students were identified as being at risk for eating disorders. These prevalence rates are largely consistent with previous studies conducted among university students, particularly those enrolled in health-related programs (18,19). University students' nutritional behaviors are shaped by social, cultural, and environmental factors, and the present findings further highlight the importance of the university period in the development of healthy eating habits.

In the present study, food literacy was associated with gender, age, self-perception, paying attention to healthy eating, ideal daily consumption of fruits, vegetables, legumes, and grains, and daily sugar consumption. Lower food literacy levels observed among male students are in line with findings reported by Koçaslan (19), Erten (20), and Çınkıl and Büyük (21). The positive association between age and food literacy may reflect increasing nutritional awareness and experience over time. Furthermore, students who paid attention to healthy eating and adhered to recommended dietary patterns demonstrated higher food literacy levels, supporting previous evidence that food literacy is closely linked to healthier dietary behaviors (11,12,18).

No statistically significant associations were found between food literacy and income status, place of residence, accommodation type, parental education level, physical activity, or body mass index. However, the literature reports inconsistent findings regarding these factors (1,19, 20, 22). Such discrepancies may be explained by differences in study populations, institutional environments, and sociocultural contexts. These results suggest that the determinants of food literacy may vary across different university settings, emphasizing the need for context-specific approaches when designing interventions.

Regarding eating disorders, significant associations were identified with self-perception, meal regularity, restricting food intake to stay thin or maintain ideal weight, fast food consumption habits, emotionally driven eating, body mass index, and education level. In particular, the higher risk of eating disorders among individuals who perceived themselves as overweight or normal weight underscores the critical role of body perception in eating behaviors. These findings are consistent with previous studies conducted by Kermen et al. (7) and Kartal and Aykut (23). The observed relationships between eating disorders, emotional eating, and fast food consumption are also supported by earlier research (24-26).

In contrast, no significant relationships were found between eating disorder risk and income status, accommodation type, parental education level, or department of study. While some studies have reported associations between these variables and eating disorders (24, 27, 28), others have yielded similar findings to those of the present study (6). These inconsistencies may reflect the multifactorial nature of eating disorders and the influence of cultural and environmental differences. The inverse association observed between body mass index and eating disorder risk is consistent with some previous studies (7, 23), although contradictory findings have also been reported (6), suggesting that this relationship may differ depending on sample characteristics and assessment methods.

Overall, the findings of this study indicate that both food literacy and eating disorders among university students are influenced by a complex interplay of individual perceptions, dietary behaviors, and lifestyle factors. These results suggest that university-based health promotion initiatives may benefit from focusing on modifiable factors such as self-perception, regular meal patterns, and healthy food choices. Interventions targeting these areas, alongside environmental strategies such as improving the nutritional quality of food provided in university cafeterias and dormitories or integrating food literacy content into educational curricula, may contribute to healthier eating behaviors among university students.

Limitations: This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design of the study precludes causal inference; therefore, the observed associations reflect relationships at a single point in time rather than cause-and-effect relationships. Second, the data were collected using self-reported questionnaires, particularly for sensitive topics such as eating disorders and dietary habits, which may have introduced recall bias and social desirability bias. Third, the study sample was drawn from a single university, which may limit the generalizability of the findings to the broader university student population in Türkiye or to students from different sociocultural backgrounds.

Strengths of the Study: Despite these limitations, this study has several notable strengths. To our knowledge, it is one of the first studies to concurrently evaluate food literacy and eating disorder status among university students while examining a comprehensive set of sociodemographic, nutritional, and behavioral factors. Unlike many previous studies that have addressed these concepts separately, the integrated approach used in this study provides a more holistic understanding of the complex relationships influencing students' nutritional health. Additionally, the application of inferential statistical analyses alongside descriptive statistics enabled the examination of associations beyond simple prevalence estimates. The inclusion of students from various faculties and academic departments, rather than a single discipline, further enhanced the diversity of the sample and increased the relevance of the findings to a broader university context. These strengths support the potential contribution of the study to university-based health promotion initiatives and future research in this field.

Conclusions

This study evaluated food literacy, eating disorders, and their associated factors among university students. The key findings revealed that gender, age, self-perception, attention to healthy eating, ideal consumption of fruits, vegetables, legumes, and grains (excluding potatoes and corn), and ideal daily sugar consumption were significantly associated with food literacy. Similarly, self-perception, meal regularity, dietary restriction for weight control, fast food consumption, emotionally driven eating, BMI, and education level were identified as significant factors associated with eating disorders.

Students in health sciences disciplines, such as medicine and dentistry, represent a crucial group due to their dual role as individuals whose personal health behaviors can impact their future professional practice and have a potential impact on public health. Therefore, university health promotion initiatives should consider targeting the modifiable factors identified in this study, such as improving self-perception and promoting regular meal patterns, through workshops and counseling services.

Furthermore, the significant associations found between the university environment (e.g., departmental affiliation) and dietary behaviors suggest that structural interventions could be beneficial. Future research should investigate the efficacy of practical measures, such as enhancing the nutritional quality of food available in university cafeterias and dormitories, and evaluating the impact of integrating food literacy modules into existing curricula.

In conclusion, this study provides evidence-based insights into the complex interplay of factors affecting university students' nutritional health. Addressing these issues through targeted support and environmental changes within the university setting holds promise for fostering healthier behaviors among this key demographic.

Conflict of interest statement
There is no conflict of interest.
Ethics committee approval (place/date/number)
The ethical approval of this study was obtained by the Non-Interventional Clinical Research Ethics Committee of the Rectorate of Kütahya Health Sciences University (KHSU) (2022/05-17, 20.04.2022) and was conducted in accordance with the ethical principles set forth in the Declaration of Helsinki, the latest version of which was made at the 64th WMA General Assembly in 2013.
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