Relationships among eating attitudes, body image, self-esteem, and body mass index in adolescents

Relaciones entre las actitudes alimentarias, la imagen corporal, la autoestima y el índice de masa corporal en adolescentes

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Abstract

Introduction: The literature indicates that, during adolescents, body mass index (BMI), self-esteem, and eating attitudes are closely interrelated.
Purpose: The purpose of this study was to examine the relationships among eating attitudes (EAT), body mass index (BMI), body image discrepancy, and self-esteem in adolescents, and to investigate the effects of gender and age on these variables.
Methods: A cross-sectional methodological design was used. The sample consisted of 387 adolescents aged 15–18 years (177 males, 210 females) living in Eskisehir Province. Data were collected using a demographic questionnaire, the Eating Attitudes Test (EAT-26), the Figure Rating Scale (FRS), and the Rosenberg Self-Esteem Scale (RSES). BMI was calculated based on participants' height and weight. Independent-samples t-tests, ANOVA, and Pearson's correlation analyses were conducted.
Results: Female adolescents reported significantly higher EAT scores than males, whereas male adolescents exhibited higher BMI values. No significant age-related differences were found in EAT, BMI, body image discrepancy, or self-esteem. Correlation analyses showed that EAT scores were positively associated with body image discrepancy and negatively associated with self-esteem. The strongest association was observed between BMI and body image discrepancy, while BMI was not directly related to EAT or self-esteem.
Conclusions: The findings indicate that adolescents' EAT are more strongly associated with psychological factors, particularly body image and self-esteem, than with objective weight status. These results highlight the importance of preventive and intervention strategies that address body image and psychological well-being to promote healthy eating behaviors during adolescence.

Keywords

Adolescents; body mass index; body image; eating attitudes; self-esteem.

Resumen

Introducción: La literatura indica que, durante la adolescencia, el índice de masa corporal (IMC), la autoestima y las actitudes alimentarias están estrechamente interrelacionados.
Propósito: El propósito de este estudio fue examinar las relaciones entre las actitudes alimentarias (EAT), IMC, la discrepancia de la imagen corporal y la autoestima en adolescentes, así como investigar los efectos del género y la edad sobre estas variables.
Métodos: Se utilizó un diseño metodológico transversal. La muestra estuvo compuesta por 387 adolescentes de entre 15 y 18 años (177 varones y 210 mujeres) residentes en la provincia de Eskişehir. Los datos se recopilaron mediante un cuestionario sociodemográfico, el Test de Actitudes Alimentarias (EAT-26), la Escala de Figuras (FRS) y la Escala de Autoestima de Rosenberg (RSES). El IMC se calculó a partir de la estatura y el peso de los participantes. Se realizaron pruebas t para muestras independientes, análisis de varianza (ANOVA) y análisis de correlación de Pearson.
Resultados: Las adolescentes mujeres informaron puntuaciones de EAT significativamente más altas que los varones, mientras que los adolescentes varones presentaron valores de IMC más elevados. No se encontraron diferencias significativas relacionadas con la edad en las actitudes alimentarias, el IMC, la discrepancia de la imagen corporal ni la autoestima. Los análisis de correlación mostraron que las puntuaciones de EAT se asociaron positivamente con la discrepancia de la imagen corporal y negativamente con la autoestima. La asociación más fuerte se observó entre el IMC y la discrepancia de la imagen corporal, mientras que el IMC no se relacionó directamente con las actitudes alimentarias ni con la autoestima.
Conclusiones: Los hallazgos indican que las actitudes alimentarias de los adolescentes están más fuertemente asociadas con factores psicológicos, en particular la imagen corporal y la autoestima, que con el estado ponderal objetivo. Estos resultados resaltan la importancia de estrategias preventivas y de intervención que aborden la imagen corporal y el bienestar psicológico para promover conductas alimentarias saludables durante la adolescencia.

Palabras clave

Adolescentes; índice de masa corporal; imagen corporal; actitudes alimentarias; autoestima.

Introduction

Adolescence represents a critical developmental period marked by rapid and multidimensional changes in physical, psychological, and social domains (Steinberg, 2017). During this sensitive phase, biological processes such as accelerated growth, changes in body composition, and hormonal fluctuations occur simultaneously and significantly shape adolescents' body perceptions and self-evaluations (Toselli et al., 2021). Previous research has consistently emphasized that these physical changes are closely associated with psychological adjustment and health-related behaviors in adolescence (Patton et al., 2016).

Body mass index (BMI) is a widely used anthropometric indicator for monitoring growth and development during adolescence; however, its relevance extends beyond physical health outcomes. Empirical evidence suggests that BMI is associated with psychological well-being, body image, and eating-related behaviors among adolescents (Cole et al., 2000; Toselli et al., 2021; Ward et al., 2019). Adolescents with higher BMI levels are more likely to experience body dissatisfaction and negative body image perceptions, which have been identified as significant risk factors for unhealthy eating attitudes (Öge-Enver et al., 2025). Nevertheless, the association between BMI and eating attitudes appears to be largely indirect, with body image and self-esteem functioning as key cognitive and emotional mediators in this relationship (Mitchison & Hay, 2014; Bi et al., 2024).

Self-esteem is a central psychological construct reflecting individuals' global evaluation of self-worth and is particularly salient during adolescence due to heightened social comparison and increased appearance-related concerns. Research indicates that higher levels of self-esteem are associated with more favorable mental and physical health outcomes and serve as a protective factor against risky health behaviors (Orth & Robins, 2022; Patton et al., 2016). Conversely, low self-esteem has been consistently linked to depression, anxiety, disordered eating behaviors, and other maladaptive psychological outcomes (Sowislo & Orth, 2013). In contemporary societies where physical appearance plays a prominent role in social acceptance, pressures to conform to idealized body standards may undermine self-esteem and contribute to negative body image, thereby increasing vulnerability to disordered eating behaviors (Tanguay et al., 2025).

Body image is a multidimensional construct encompassing individuals' cognitive, perceptual, and emotional evaluations of their bodies. During adolescence, increased exposure to social media, appearance-based peer comparisons, and the internalization of sociocultural body ideals render body image particularly vulnerable to disturbance (Jarman et al., 2021). Empirical evidence indicates that body image serves as a key mediating variable in the relationship between self-esteem and eating-related outcomes (Huang & Wan, 2025). Adolescents experiencing body dissatisfaction are more likely to exhibit unhealthy eating attitudes, including restrictive dieting, uncontrolled eating, and emotional eating behaviors (Chan et al., 2025).

Eating attitudes (EAT) refer to individuals' beliefs, emotions, and behaviors related to food and nutrition and play a crucial role in adolescents' identity development and emotional regulation. Although such attitudes may not meet clinical diagnostic criteria, disordered eating attitudes are considered important predictors of subsequent eating disorder symptoms and maladaptive eating behaviors (Hanson et al., 2025). Therefore, examining eating attitudes in conjunction with body image, BMI, and self-esteem is essential for developing a comprehensive understanding of adolescents' health-related behaviors. Despite substantial evidence documenting associations among these variables, studies examining BMI, self-esteem, body image, and eating attitudes within an integrated framework remain limited. Furthermore, findings indicating gender-related differences in these relationships underscore the importance of examining adolescent boys and girls separately (Öge-Enver et al., 2025; Toselli et al., 2021). Accordingly, the present study aims to examine the associations among BMI, self-esteem, body image, and eating attitudes in adolescents.

Method

Study Design

A cross-sectional methodological design was employed to examine the interrelationships among body image discrepancy, body mass index (BMI), eating attitudes (EAT), and self-esteem in an adolescent population. This design was deemed appropriate for assessing associations among psychological and anthropometric variables within a defined population at a single point in time. Data were collected between November 2025 and January 2026 from adolescents aged 15–18 years residing in Eskisehir Province, Turkey.

Participants

The study sample consisted of 387 adolescents (177 males and 210 females), with a mean age of 16.14 years (SD = 1.13). Participants were recruited from public secondary schools in Eskisehir Province using a non-probability convenience sampling method. Recruitment was carried out during regular school hours following institutional approval and was based on voluntary participation.

Eligibility criteria included being between 15 and 18 years of age, residing in Eskisehir Province, possessing sufficient cognitive capacity to understand and complete the study instruments, and providing informed consent. In addition to adolescent assent, written informed consent was obtained from parents or legal guardians prior to participation. Adolescents with a documented diagnosis of psychiatric disorders, chronic medical conditions, or health problems that could potentially influence eating behaviors or body composition were excluded to minimize potential confounding effects.

An a priori power analysis was conducted using G*Power version 3.1 to determine the minimum required sample size. Assuming a small-to-moderate effect size (r = 0.20), an alpha level of .05, and statistical power of 80%, the analysis indicated that a minimum of 193 participants was required. To account for potential attrition, missing data, or incomplete responses, a larger sample was targeted. The final sample of 387 adolescents exceeded the minimum requirement, thereby enhancing the robustness and reliability of the statistical analyses.

Data were collected using structured questionnaires administered through individual, face-to-face interviews conducted by trained researchers in a quiet classroom setting. This approach was adopted to ensure standardized administration procedures and to reduce the likelihood of missing or inaccurate responses.

Measures

Demographic Form

Participants completed a structured demographic questionnaire designed to collect basic sociodemographic and anthropometric information, including age, gender, self-reported height, and body weight.

BMI Calculation

Body mass index (BMI) was calculated using the standard formula of weight in kilograms divided by height in meters squared (kg/m^2). BMI values were categorized as underweight, normal weight, overweight, or obese according to the World Health Organization (WHO) classification criteria (Garrow & Webster, 1985).

EAT-26

Eating attitudes were assessed using the Eating Attitudes Test (EAT-26), originally developed by Garner et al. (1982) and adapted for the Turkish population by Ergüney-Okumuş and Sertel-Berk (2020). The scale consists of 26 items rated on a six-point Likert-type response format, with higher total scores indicating greater levels of disordered eating attitudes. Items 1–25 are scored on a four-point scale ("Sometimes," "Rarely," and "Never" = 0; "Often" = 1; "Usually" = 2; "Always" = 3), whereas Item 26 is reverse scored. In the present study, the Turkish version of the EAT-26 demonstrated acceptable internal consistency (Cronbach's α = .75).

Body Image Satisfaction (BIS)

Body image satisfaction was assessed using the Figure Rating Scale (FRS) developed by Stunkard et al. (1983). The scale consists of nine gender-neutral silhouettes representing progressively increasing body size, ranging from very thin to obese. Owing to its visual and nonverbal format, the FRS is considered appropriate for use with adolescent populations (Truby & Paxton, 2002). Participants were asked to select the figure that best represented their perceived current body shape (FRS-current) and their ideal body shape (FRS-ideal). Body image satisfaction was operationalized using the Feel–Ideal Discrepancy (FID) score, calculated by subtracting the FRS-ideal score from the FRS-current score. A discrepancy score of zero indicated body satisfaction, whereas positive and negative values reflected a desire for a thinner or larger body shape, respectively.

Rosenberg Self-Esteem Scale (RSES)

Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965), which was adapted into Turkish by Çuhadaroğlu (1986). The RSES comprises 10 items assessing global self-worth, rated on a four-point Likert scale. Total scores range from 10 to 40, with higher scores indicating greater levels of self-esteem. The scale has demonstrated satisfactory psychometric properties in Turkish adolescent samples (Çeçen, 2008).

Ethical Considerations

Ethical approval for the study was obtained from the Scientific Research and Publication Ethics Committee of Eskisehir Technical University (Protocol No. 116491; October 14, 2025). All necessary institutional permissions were secured prior to data collection. Participants and their legal guardians were informed about the study objectives, procedures, and voluntary nature of participation, and written informed consent was obtained in accordance with the Declaration of Helsinki.

Data Analysis

Statistical analyses were conducted using SPSS version 25.0. Prior to inferential analyses, assumptions of normality and homogeneity of variance were assessed by examining skewness and kurtosis values and by applying Levene's test. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were calculated to summarize participants' demographic characteristics and scores on the EAT-26, FID, RSES, and BMI.

Gender differences were examined using independent-samples t tests, while age-group comparisons were analyzed using one-way analysis of variance (ANOVA). Associations among EAT-26, FID, RSES, and BMI were evaluated using Pearson's product–moment correlation coefficients. Effect sizes were interpreted according to Cohen's (1988) criteria. Statistical significance was set at $p < .05$, $p < .01$, and $p < .001$, and all analyses were conducted using a two-tailed approach.

Results

Table 1 presents the descriptive statistics of the sociodemographic and anthropometric characteristics of the adolescents included in the study (N= 387). The gender distribution of the sample was relatively balanced, with a slightly higher proportion of female (54.3%) participants compared to males (45.7%). The age distribution indicated that the majority of participants were concentrated in the mid-adolescent period (15 years, 30.7%; 16 years, 25.6%; 17 years, 24.5%; 18 years, 19.1%).

Regarding anthropometric measures, descriptive statistics showed that height (M= 172.2 cm, SD = 10.1) and body weight (M= 63.5 kg, SD = 13.6) were distributed within age-appropriate ranges across the sample. Consistently, mean BMI (M= 21.3 kg/m^2, SD = 3.2) values fell within the normal weight range. These findings indicate that the sample was generally homogeneous and exhibited a healthy body weight profile.

Table 1. The descriptive characteristics of adolescents

Variables	N(%) or M (SD)
Sex	
Female	210 (54.3%)
Male	177 (45.7%)
Age	
15 age	119 (30.7%)
16 age	99 (25.6%)
17 age	95 (24.5%)
18 age	74 (19.1%)
Height	172.2 (10.1)
Weight	63.5 (13.6)
BMI	21.3 (3.2)

Note. BMI: Body Mass Index; N: number; %: percentage; Sd: Standard deviation; M: Mean.

Table 2 presents group comparisons of EAT-26, FID, RSES, and body mass index (BMI) scores according to adolescents' demographic characteristics. Gender-based comparisons indicated that female adolescents had significantly higher EAT-26 scores than male adolescents ($t = 3.722$, $p < .001$). In contrast, BMI scores were significantly higher among male adolescents compared to females ($t = -4.325$, $p < .001$). No statistically significant gender differences were observed in body image discrepancy (FID) or self-esteem (RSES) scores; however, females exhibited relatively higher FID scores, whereas males reported comparatively higher self-esteem levels ($p = .064$ and $p = .225$, respectively).

Analyses of variance across age groups revealed no statistically significant differences in EAT-26, FID, or BMI scores (EAT-26: $F = 0.979$, $p = .403$; FID: $F = 0.433$, $p = .729$; BMI: $F = 1.825$, $p = .142$). Although some variation in self-esteem scores was observed across age groups, these differences did not reach statistical significance ($F = 2.557$, $p = .055$). Overall, the findings indicate that gender, but not age, was significantly associated with eating attitudes and BMI among adolescents, whereas body image discrepancy and self-esteem were not significantly influenced by demographic variables in the present sample.

Table 2. Comparison of adolescents' descriptive characteristics with EAT-26, FID, RSES and BMI scores.

Variable		EAT-26 M (SD)	FID M (SD)	RSES M (SD)	BMI M (SD)
Gender	Female	15.24 (12.90)	0.54 (1.08)	29.22 (6.93)	20.64 (3.02)
	Male	10.84 (9.78)	0.28 (1.52)	30.05 (6.33)	22.02 (3.25)
t		3.722	1.915	-1.216	-4.325
p		0.000***	0.064	0.225	0.000***
Age	15 age	12.66 (11.21)	.4370 1.47084	28.25 (6.92)	20.94 (3.27)
	16 age	12.95 (10.33)	.4545 1.27993	30.33 (6.88)	21.33 (3.16)
	17 age	14.98 (14.49)	.3053 1.09227	29.81 (6.27)	21.08 (3.11)
	18 age	12.27 (10.52)	.5270 1.33676	30.52 (6.23)	22.00 (3.18)
F		.979	.433	2.557	1.825
p		.403	.729	.055	.142

Note. EAT-26: Eating Attitude Test; FID: The Feel–Ideal Discrepancy; RSES: Rosenberg Self-Esteem Scale; BMI: Body Mass Index; t: Independent-samples t-tests; F: ANOVA; Sd: Standard deviation; M: Mean . Significant differences, p<0.05*, p<0.01**, and p<0.001***

As shown in Table 3, Pearson correlation coefficients among EAT-26, FID, RSES, and BMI scores are accompanied by Cohen's d values to quantify effect sizes. Cohen's d was obtained by converting Pearson's r using the formula $d = 2r / \sqrt{(1 - r^2)}$.

Table 3. Correlation coefficients between EAT-26, FID, RSES and BMI scores.

		EAT-26	FID	RSES	BMI
EAT-26	r	1			
	p				
FID	r	0.149**	1		
	p	0.003			
RSES	r	-0.154**	-0.131**	1	
	p	0.002	0.010		
BMI	r	0.032	0.608**	-0.002	1
	p	0.531	0.000	0.971	

Note. EAT-26: Eating Attitude Test; FID: The Feel–Ideal Discrepancy; RSES: Rosenberg Self-Esteem Scale; BMI: Body Mass Index, r: Pearson's product-moment correlation coefficients. Significant differences, p<0.05*, p<0.01**, and p<0.001***

The analysis revealed a statistically significant positive correlation between EAT-26 and FID scores ($r = 0.149$, $p = 0.003$), corresponding to a small effect size ($d \approx 0.30$). This finding indicates that higher levels of disordered eating attitudes were associated with greater discrepancies between perceived and ideal body size, although the magnitude of this association was limited. Additionally, EAT-26 scores were significantly negatively correlated with RSES scores ($r = -0.154$, $p = 0.002$), reflecting a small effect size ($d \approx 0.31$), indicating that adolescents with more disordered EAT tended to report lower self-esteem

FID scores were significantly negatively correlated with RSES ($r = -0.131$, $p = 0.010$; $d \approx 0.27$), suggesting that higher FID was associated with lower self-esteem. Conversely, FID showed a strong positive correlation with BMI ($r = 0.608$, $p < 0.001$; $d \approx 1.52$), indicating a large effect size. This result suggests that increases in BMI were strongly associated with greater perceived discrepancies between current and ideal body size among adolescents. No significant correlations were observed between EAT-26 and BMI ($r = 0.032$, $p = 0.531$; $d \approx 0.06$) or between BMI and RSES ($r = -0.002$, $p = 0.971$; $d \approx 0.00$), both indicating negligible effect sizes

Overall, these findings indicate that eating attitudes are more closely related to self-esteem and body image perception than to BMI. Conversely, BIS appears to be strongly influenced by BMI in adolescents, underscoring the importance of considering both psychological and physical factors when addressing eating behaviors and body image during adolescence.

Discussion

This study examined the relationships among eating attitudes (EAT), self-esteem, body mass index (BMI), and body image in adolescents, as well as the effects of gender and age on these variables. The findings indicated that female adolescents reported significantly higher EAT scores than their male counterparts, a result consistent with previous research documenting a higher prevalence of disordered eating attitudes among girls. This gender disparity has frequently been attributed to sociocultural influences, appearance-related pressures, and the internalization of thin-ideal standards (Atasoy, 2025; Biedron et al., 2025; Yurtdaş-Depboylu et al., 2022; Petrovics et al., 2021; Ennis, 2012). However, the literature also presents mixed findings, with several studies reporting no significant gender differences in eating attitudes among university students, children, and adolescents (Choi & Kim, 2014; Gökkaya & Kargül, 2022; Tayfur & Evrensel, 2020). These inconsistencies suggest that gender-related differences in eating attitudes may be contingent upon developmental stage, cultural context, and sample characteristics.

In the present study, male adolescents exhibited significantly higher BMI values. Previous research has yielded inconsistent findings regarding gender differences in BMI. While large-scale international studies have reported a higher prevalence of overweight and obesity among male university students, even when mean BMI values remain within the normal range (Sapak & Yalız-Solmaz, 2025; Peltzer et al., 2014; Jamshed et al., 2018), other studies have documented higher rates among females or no significant gender-based differences in child and adolescent populations (Paredes et al., 2024; Altınbaş, 2022; Paredes et al., 2025; Yáñez-Sepúlveda et al., 2025). Taken together, these divergent findings indicate that BMI distributions are likely shaped by contextual, sociocultural, and lifestyle-related factors rather than by gender alone. Moreover, the absence of significant gender differences in Feel–Ideal Discrepancy (FID) and Rosenberg Self-Esteem Scale (RSES) scores suggests that body-related concerns and self-evaluative processes may be experienced similarly by female and male adolescents.

Age was not significantly associated with EAT, FID, RSES, or BMI among adolescents aged 15–18 years, indicating relative stability in these psychological and physical indicators during mid-to-late adolescence. Developmental psychology literature characterizes this period as one in which body-related perceptions and self-evaluative beliefs become increasingly consolidated, resulting in limited age-related variability (Steinberg, 2014). Consistent with this perspective, previous studies have reported minimal age-related differences in eating attitudes and body image indicators during late adolescence, emphasizing the stronger influence of sociocultural factors, individual psychological

characteristics, and environmental contexts over chronological age (Ricciardelli & Yager, 2016; Rodgers et al., 2015). Accordingly, media exposure, peer norms, and family attitudes appear to play a central role in shaping adolescents' eating behaviors and body-related perceptions, underscoring the importance of psychosocially oriented prevention strategies.

Correlation analyses further revealed that EAT scores were positively associated with FID and negatively associated with self-esteem, indicating that adolescents experiencing greater body dissatisfaction and lower self-worth are more likely to exhibit disordered eating attitudes. Although the observed effect sizes were small, their statistical significance underscores the relevance of psychological factors in the development of eating-related attitudes during adolescence. These findings align with prior research conducted among children, adolescents, and young adults across diverse cultural contexts (Aruguete et al., 2005; Pedro et al., 2016; Prioreschi et al., 2017; Choi & Kim, 2014; Mallaram et al., 2023; Atasoy, 2025). Furthermore, self-esteem has consistently been identified as a key correlate of eating attitudes, with lower levels of self-esteem associated with greater eating-related disturbances (Hudson, 2008; Shah et al., 2024; Bozduğan, 2023; Ergüven, 2023). Collectively, these findings suggest that even modest variations in body perception and self-evaluation may have meaningful implications for adolescents' eating behaviors.

The strongest association observed in the present study was between BMI and FID, indicating that higher BMI values were strongly related to greater perceived discrepancies between actual and ideal body size. This finding highlights the influence of objective anthropometric indicators on adolescents' subjective body image evaluations, particularly during periods of heightened body awareness. Consistent with previous research, elevated BMI has been associated with increased body image dissatisfaction and body size discrepancy among adolescents and young adults (Hudson, 2008; Prioreschi et al., 2017; Rostampour et al., 2022; Shah et al., 2024). However, BMI was not significantly associated with EAT or self-esteem in the present study, suggesting that weight status alone does not directly determine eating-related attitudes or global self-evaluation. Rather, adolescents' subjective body perceptions appear to play a more central role than objective weight indicators in shaping eating-related attitudes.

Overall, the findings indicate that eating attitudes during adolescence are primarily influenced by psychological factors, particularly body image and self-esteem, whereas BMI predominantly affects body image perceptions. These results underscore the importance of preventive and intervention strategies that simultaneously address body image, self-esteem, and eating attitudes to promote adolescents' psychological well-being and healthy eating behaviors.

Conclusions

The findings indicate that EAT among adolescents are more closely associated with FID and RSES than with BMI. Although BMI emerged as a strong predictor of body image discrepancy, it was not directly associated with eating attitudes or self-esteem. This suggests that disordered eating attitudes during adolescence cannot be explained solely by physical weight indicators and that psychological factors play a more decisive role.

Consistent with previous research, female adolescents were found to exhibit higher levels of disordered eating attitudes compared to their male counterparts. This difference may be related to factors such as sociocultural pressures, increased sensitivity to physical appearance, and the internalization of thinness ideals. In contrast, age was not identified as a significant determinant of eating attitudes, body image discrepancy, self-esteem, or BMI, indicating a relative stability of these variables across the adolescent age range examined.

Overall, these findings underscore the importance of prioritizing psychological well-being and body image in preventive and intervention programs aimed at promoting healthy eating behaviors among adolescents. Approaches focusing solely on weight control may be insufficient; instead, comprehensive interventions that strengthen self-esteem, improve body image perceptions, and account for sociocultural influences are likely to be more effective in reducing disordered eating behaviors.

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