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Positive attitudes toward physical activity and eating disorders in university students: the moderating role of gender

Sinan Uğraş¹, Barış Mergan², Mehmet Akif Yücekaya³, Ahmet Enes Sağın⁴, Fatih Ateş⁵ and Emrah Aykora^{6*} 

Abstract

Background Eating disorders affect both male and female populations worldwide. Previous studies suggest that attitudes toward physical activity may play a key role in their development. Understanding this relationship is essential for designing effective prevention and treatment strategies. In this study, “positive attitudes toward physical activity” refer to motivational and affective dispositions, such as valuing, enjoying, and being willing to engage in physical activity. The study aimed to explore the effects of such attitudes on various subdimensions of eating disorders, as well as the moderating role of gender in these associations.

Methods University students from different regions of Türkiye participated in the study ($n = 609$; age $M = 21.0$, $SD = 1.95$). The gender distribution was 49.9% females and 50.1% males. The gender distribution was 49.9% females ($n = 304$) and 50.1% males ($n = 305$). Data were collected with the Physical Activity Attitude Scale for Children and Adolescents and the Eating Disorder Scale–Short Form (EDE-Q-13). SEM and Jamovi MedMod moderation tests were used to analyze the data.

Results Positive attitudes toward physical activity did not significantly predict eating restraint ($\beta = -0.0865$, $z = -1.94$, $p > .05$) or shape/weight over-evaluation ($\beta = -0.0836$, $z = -1.87$, $p > .05$). However, they were significantly and inversely associated with body dissatisfaction ($\beta = -0.1788$, $z = -3.87$, $p < .001$), bingeing ($\beta = -0.3201$, $z = -6.75$, $p < .001$), and purging ($\beta = -0.4591$, $z = -9.58$, $p < .001$). Based on the positive and significant result of the PAPA $\times$ gender interaction ($B = 0.387$, $p < .05$), gender appears to play a moderating role in the associations between physical activity attitudes and eating disorder symptoms.

Conclusions Our results indicated that while positive attitudes toward physical activity did not significantly influence eating restraint, shape or weight overevaluation, they might have suppressive effects on body dissatisfaction, bingeing, and purging. Additionally, positive attitudes toward physical activity affected female and male participants differently. These findings may inform health promotion and physical activity interventions in university settings.

Plain English summary

We found that having a positive attitude toward physical activity didn't strongly affect how people control their eating or how much they focus on their body shape or weight. However, it might help reduce negative feelings

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about the body and unhealthy behaviors like binge eating and purging. We also saw that these effects were different for women and men. These results can help guide programs that aim to improve health and encourage physical activity among university students.

Keywords Positive attitudes, Physical activity, Eating disorders, Purging, Body dissatisfaction, Self-esteem, Gender, Females, Males, Body perception

Introduction

Eating disorders are complex psychiatric disorders that strongly affect people's psychological and physical health [1]. Thus, eating disorders are associated with anxiety, depression, increased disturbing thoughts for abnormal eating behaviors, and a decrease in motivational recovery [2]. The main crucial factors behind these behaviors are weight, body shape, and attitudes toward food intake. During this process, males commonly focus on muscularization, whereas females tend to lose weight [3, 4]. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) identified eating disorders as anorexia nervosa (AN), bulimia nervosa (BN), binge eating (BED), avoidant/restricted food intake disorders, and other nutritional disorders [5]. Epidemiologic statistics have revealed that, steadily, there is a growing mass of people with eating disorders, and the prevalence of these disorders is increasing worldwide [6].

Epidemiological data highlight notable differences in prevalence across diagnostic categories and gender. The lifespan prevalence of eating disorders was reported to be 0.8%–6.3% for AN, 0.8%–2.6% for BN, and 1%–6% for BED, and according to sex, it was 8.4% for females and 2.2% for males. Additionally, the prevalence of eating disorders is 4.6% in the United States and 3.5% in Asian countries [6–10]. Moreover, because of industrialization, globalization, and the widespread dissemination of social media use, body perception has increased, resulting in severe eating disorders [1]. Among the population suffering from eating disorders, some groups have increased risks of eating disorders. Borowiec et al. [11] reported that sports branches where aesthetic concerns, such as gymnastics, dances, and artistic swimming, are at the forefront are associated with increased risks of eating disorders. Additionally, unhealthy eating habits, such as athletics, karate, and taekwondo, may occur in sports in which weight control is essential. These athletes have to enhance performance while they have to provide weight categories. The mentioned study also claimed that identifying sports branches as 'lean aesthetic' (weak and aesthetic sports) and 'lean nonaesthetic' (weak but nonaesthetic categorized sports) might be more helpful for understanding eating disorders [11]. In addition, childhood experiences also have strong effects on the development of eating disorders. For example, BED during childhood triggers adolescence BED development; however, malnutrition and/or food selectivity tendencies may result in AN during

adolescence, especially in girls [12]. Therefore, establishing appropriate nutritional behaviors during childhood has decisive effects on future eating habits [13].

The children spend most of their time at school or university, where they become social and interactive, and their attitudes are set up after the family environment [14, 15]. In a previous study, university students reported an increased risk of eating disorders, and these risks were significantly correlated with social and physical anxiety and depression-like behaviors [16]. Similarly, another study reported that eating disorders are increasingly common among university students [17]. Additionally, students with depression-like symptoms and a high body mass index (BMI) are at greater risk of eating disorders. Researchers have focused on children in crowded families with decreased risks of eating disorders. They also noted that higher BMI and depression levels are strongly correlated with eating disorders [18].

Eating disorders are complex public health problems shaped by the interaction of cultural norms, societal expectations, and individual psychosocial factors. Several studies conducted among university students in Türkiye have shown that this group is at high risk for eating disorders [19, 20]. The university years in Türkiye represent a critical transition period during which individuals often leave their families for the first time and experience increased academic and social pressures, leading to significant changes in lifestyle and eating habits [16]. Particularly among female students, depression, social physique anxiety, and negative body image perceptions have been found to significantly increase the risk of developing eating disorders [16, 19]. Additionally, studies have shown that this risk exhibits meaningful gender-based differences in Türkiye; while females are generally more susceptible to disordered eating, variables such as anxiety levels may play a more central role among males [20]. Therefore, the Turkish university student population represents a culturally and socio-demographically unique context that warrants specific investigation of eating and physical activity behaviors.

Cumulative studies have revealed that eating disorders negatively affect academic performance [21] and attention deficits [22], weaken social interaction [23], and impose a global burden financially and socioeconomically [24–26]. Therefore, early diagnosis of eating disorders may alleviate unexpected results or facilitate recovery. For example, in a recent meta-analysis [27],

the preventive framework against eating disorders for university students and early therapeutic programs significantly reduced abnormal eating behaviors such as inappropriate diets, body dissatisfaction, and thinness expectations. Early intervention approaches not only prevent eating disorders but also contribute to reducing the financial burden on healthcare companies. Bode et al. [28] reported that early intervention for eating disorders resulted in long-term financial savings to German healthcare systems. In particular, savings of 1 euro each from the prevention of AN and BN have increased by 2.33–4.05 euros every consecutive year.

In the context of coping with eating disorders, reducing or eliminating abnormal eating habits may depend on interventions such as providing a healthy weight and avoiding mismatches [29], school-based or peer relationship guidance [30], web-based cognitive-behavioral education [31], healthy lifestyle programs [32], group-based programs [33], boarding or daily programs [34], and physical activity approaches [35]. Among them, physical activity has greater advantages in overcoming cues related to eating disorders. Regular physical activity provides a positive contribution to reducing not only eating disorders but also psychological and mental wellness, sustaining positive body image, and enhancing health literacy [27, 36–38]. Sustained participation in physical activity and continuity are dependent mainly on attitudes toward physical activity [39]. The general attitudes of individuals are determinants of social development, self-confidence, and life satisfaction [40]. Nevertheless, negative attitudes before adolescence mainly reduce attitudes toward physical activity and are a key predictor of participation in physical activity [41]. Overall, positive attitudes toward physical activity clearly contribute to the prevention of eating disorders. Conversely, compulsory attitudes toward physical activity hold the potential for continuing eating disorder symptoms [41]. A study conducted by Brunet, Del Duchetto, and Wurz [42] indicated that nonfunctional attitudes of females with symptoms of eating disorders reduce physical activity performance and cause difficulties in the treatment process. Danielsen et al. [43] reported that increasing positive attitudes toward physical activity reduced the incidence of eating disorders and BMI.

Another view is the associations among demographic variables, attitudes toward physical activity and influence on eating disorders [44]. Despite existing evidence, more quantitative and qualitative data are needed to fully elucidate these gaps. Females may experience social pressure to engage in frequent and intensive exercise in order to achieve a thinner appearance, which increases their sensitivity to developing eating disorders [3, 4]. Eguren-Garcia et al. [45] demonstrated that the risk of developing eating disorders in females is greater in the

first year of university and increases during the academic year. Among females, excessive and uncontrollable exercise (compulsive exercise) is another factor related to the development of eating disorders on the basis of body shape and weight gain anxiety. It has also been suggested that avoidant and focused principal behaviors, weight control exercise, and a lack of enjoyment of exercise significantly increase eating disorder symptoms [46]. Females are forced to perform frequent and excessive performance exercises to access thinner individuals, which increases their sensitivity to developing eating disorders [3, 4]. Overall, it is strongly suggested that sex is the main factor affecting the development of eating disorders [47]. Although the relationship between physical activity and eating disorders has been widely studied, limited research has examined this association specifically in the context of university students in Türkiye, where cultural and lifestyle factors may uniquely influence these behaviors. This study aimed to examine the associations between positive attitudes toward physical activity and subdimensions of eating disorders among Turkish university students. In addition, the moderating effect of gender was analyzed.

Methods

Participants

The participants are university students studying in the provinces of Rize, Diyarbakır, Bartın, Malatya, Çanakkale, Tokat, and Sivas, which are located in different regions of Turkey. Inclusion criteria included being an undergraduate student aged between 18 and 25 years, and exclusion criteria were having a chronic medical condition, a formal psychiatric diagnosis, or currently receiving psychiatric treatment. No stratified sampling method was used; thus, while the sample consists of students from a variety of faculties and disciplines, it is not nationally representative.

The study group comprised 609 university students from different regions of Türkiye. The gender distribution of the study group included 49.9% females ($n = 304$) and 50.1% males ($n = 305$). The participants' ages varied between 18 and 25 years, and the mean age distribution was $M = 21.0$, $SD = 1.95$. The study group reflected the diversity of university students across Türkiye well. The demographic variables are presented in detail in Table 1.

Ethical considerations

This study was approved by the Tokat Gaziosmanpaşa University Social and Human Sciences Ethics Committee, with 10.12.2024/01–52 date and number ethical approval. All experimental procedures were performed in accordance with ethical rules. At the beginning of the study, all participants were informed about the aim of the study and approved as participants. The participants

Table 1 Demographic variables of the experimental group

Variables	Category/Statistics	Value
Participants		609
Gender	Female	304 (%49,9)
	Male	305 (%50,1)
Age	Mean (SD)	21,0 (1,95)
	Minimum - Maximum	18–25
Height (cm)	Mean (SD)	172 (9,29)
	Minimum - Maximum	150–200
	Largest group (165–180 cm)	%64,6
Weight (kg)	Mean (SD)	66,2 (13,9)
	Minimum - Maximum	40–130

were also informed of their privacy rights and could give up whenever they wanted without any justification.

Variables and measures

The children and adolescents physical activity attitudes scale The scale was previously adapted in Turkish by Uyhan et al. [48] and originally comprised 2 subdimensions and 12 items. In our study, we only used the positive attitudes toward physical activity dimension. The mentioned dimension includes 7 items and aims to determine the positive thoughts of individuals toward physical activity and motivations. The participants evaluated the given statements on a 5-point Likert scale ranging from “1 = completely disagree” to “5 = completely agree”. To test the appropriateness of the scale for the university student age group in our sample, we conducted a confirmatory factor analysis (CFA) using our dataset. According to the CFA results, the fit indices were $\chi^2=55.5/df=13/p<.001$, CFI=0.984, TLI=0.974, GFI=0.997, SRMR=0.020, and RMSEA=0.073. The mentioned values were acceptable for testing construct validity according to previous studies [49]. Reliability analysis indicated higher levels of internal consistency according to the Cronbach's alpha ($\alpha=0.904$) and McDonald's omega ($\omega=0.885$) values. All these outcomes prove the reliability and validity of the scale for measuring positive attitudes toward physical activity.

Eating disorder examination Questionnaire - EDE-Q-13 (Short Form) The Eating Disorder Examination Questionnaire - EDE-Q was developed to evaluate eating disorders first in 1994 by Fairburn and Beglin [50]. The short form of the scale (EDE-Q-13) was developed by Lev-Ari et al. [51]. In our study, the Turkish form, which was adapted in Turkish by Esin and Ayyıldız in [52], was used. The EDE-Q-13 includes 13 items and 5 subdimensions, which are used to determine personal eating habits and attitudes. The subdimensions of the EDE-Q-13 are eating restraint, shape and weight over-evaluation, body dissatisfaction, bingeing, and purging. This scale has a 7-point Likert design (0 = none, 6 = every day). A higher score indicates more intense

symptoms of an eating disorder. The construct validity of the scale was tested via CFA. The test results were $\chi^2/df=152/55/p<.001$, CFI=0.983, TLI=0.976, GFI=0.978, SRMR=0.031, and RMSEA=0.054. The mentioned values were acceptable for testing construct validity according to previous studies [49]. The internal consistency of the scale was tested by Cronbach's alpha ($\alpha=0.89$) and McDonald's omega ($\omega=0.90$), which indicated that the scale has greater internal consistency.

Data analysis

All the data were analyzed via JASP 0.18.3 software. First, descriptive statistics were determined, and normality tests were performed. Normality was evaluated via skewness and kurtosis tests. Normality was accepted as a skewness–kurtosis value between ± 2 [53]. Additionally, the data were nearly near the 45-degree line via histograms, boxplots, and Q–Q graphs. Overall, these outcomes indicate that the whole dataset has an increased level of normal distribution.

The measurement instruments used were McDonald's omega (ω) and Cronbach's alpha (α) to clarify internal consistency. In addition to reliability, the harmony between the dataset and the experimental design was tested via CFA. Fit indices such as χ^2/df , CFI, TLI, SRMR, GFI, and RMSEA were used for CFA [49]. The acceptable borders of these indices prove the adaptability of the design. Among them, values under 0.06 for RMSEA and values higher than 0.90 for CFI/TLI indicate better harmony of the research model.

The associations between variables were evaluated via Pearson's correlation analysis. In addition, the significance of the indirect effects was tested via the bootstrapping method through 5000 repeated tests to determine the 95% confidence interval. When zero (0) values for the confidence interval were not observed, the indirect effect was accepted as significant [54]. Structural equation modeling (SEM) was used to test the hypotheses. Both direct and indirect effects were tested by SEM, and multivariable distributions were taken into consideration to minimize errors [55, 56].

During data analysis, the absence of mismatched data and the assumption of normality enhanced the reliability of the results. Significance was accepted at $p<.05$.

Results

The standard deviation (SD), mean value (M), skewness and kurtosis, and Pearson's correlation results of positive attitudes toward physical activity (PAPA) and eating disorder subdimensions are presented in Table 2. The M and SD values of PAPA (M=4.18, SD=0.81), eating restraint (M=3.09, SD=1.85), shape and weight over-evaluation (M=3.35, SD=2.06), body dissatisfaction (M=3.40,

Table 2 The standard deviation (SD), mean values (M), skewness and kurtosis, and pearson's correlation results of positive attitudes toward physical activity (PAPA) and eating disorder subdimensions

Variables	PAPA	ER	SWOE	BD	B	P	Mean	SD	Skewness	Kurtosis
PAPA	—						4.18	0.80	-1.06	1.16
ER	-0.086*	—					3.09	1.85	0.581	-0.692
SWOE	-0.094*	0.675***	—				3.35	2.06	0.482	-1.04
BD	-0.175***	0.419***	0.588***	—			3.40	2.15	0.410	-1.02
B	-0.305***	0.511***	0.512***	0.584***	—		2.65	1.68	0.881	-0.163
P	-0.423***	0.445***	0.374***	0.398***	0.677***	-	2.18	1.56	1.29	0.857

* $p < .05$, ** $p < .01$, *** $p < .001$ PAPA=Positive Attitude Toward Physical Activity, ER=Eating Restraint, SWOE=Shape and Weight Over-Evaluation, BD=Body Dissatisfaction, B=Bingeing, P=Purging

Table 3 Measurement model

Factor	Indicator	β	Std. Error	z value	p	95% Confidence Interval		AVE	CR
						Lower	Upper		
Positive Attitude Toward Physical Activity	PAPA1	0.611	0.00254	15.3	< 0.001	1.000	1.000	0.583	0.906
	PAPA2	0.732	0.0812	14.8	< 0.001	1.039	1.357		
	PAPA3	0.823	0.0841	16.0	< 0.001	1.182	1.512		
	PAPA4	0.885	0.0865	16.8	< 0.001	1.281	1.620		
	PAPA5	0.773	0.0825	15.3	< 0.001	1.104	1.427		
	PAPA6	0.816	0.0839	15.9	< 0.001	1.172	1.501		
	PAPA7	0.672	0.0794	13.9	< 0.001	0.944	1.255		
Eating Restraint	ER1	0.857	0.0824	25.7	< 0.001	1.000	1.000	0.740	0.895
	ER2	0.889	0.0376	27.6	< 0.001	0.964	1.111		
	ER3	0.834	0.0385	25.2	< 0.001	0.898	1.049		
Shape and Weight Over-Evaluation	ER4	0.913	0.0228	28.6	< 0.001	1.000	1.000	0.816	0.898
	ER5	0.893	0.0335	29.2	< 0.001	0.912	1.043		
Body Dissatisfaction	ER6	0.852	0.0511	22.0	< 0.001	1.000	1.000	0.747	0.854
	ER7	0.876	0.0471	21.8	< 0.001	0.936	1.120		
Bingeing	ER8	0.809	0.0428	22.8	< 0.001	1.000	1.000	0.688	0.868
	ER9	0.857	0.0449	23.6	< 0.001	0.972	1.148		
Purging	ER10	0.822	0.0453	22.5	< 0.001	0.928	1.106	0.727	0.888
	ER11	0.895	0.0358	29.6	< 0.001	1.000	1.000		
	ER12	0.899	0.0331	30.3	< 0.001	0.939	1.069		
	ER13	0.756	0.0369	22.9	< 0.001	0.773	0.917		

SD=2.15), bingeing (M=2.65, SD=1.68), and purging (M=2.18, SD=1.56) are shown.

According to the Skewness and Kurtosis values, PAPA indicated a negative Skewness (-1.06) and positive Kurtosis (1.16); eating restraint, positive Skewness (0.581) and negative Kurtosis (-0.692); shape and weight over-evaluation, mild positive Skewness (0.482); and negative Kurtosis (-1.04). Body dissatisfaction displayed positive skewness (0.410) and negative kurtosis (-1.02), whereas the bingeing dimension displayed positive skewness (0.881) and mild negative kurtosis (-0.163). Finally, the purging dimension included skewness (1.29) and positive kurtosis (0.857).

Pearson's correlation analysis revealed a negative and significant correlation between PAPA and eating restraint ($r = -.086$, $p < .05$) and between shape and weight over-evaluation ($r = -.094$, $p < .05$). Moreover, PAPA was significantly more strongly negatively correlated with body

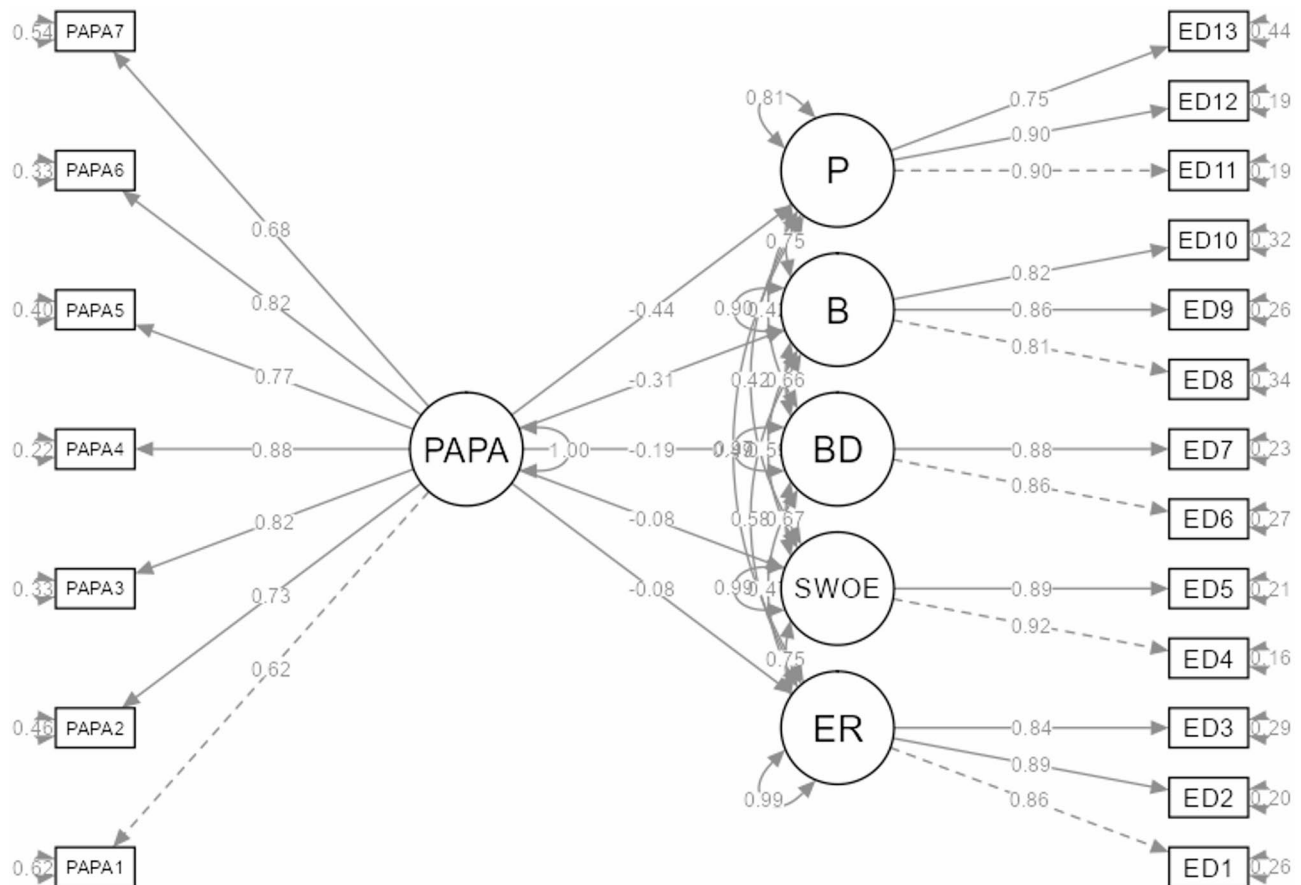
dissatisfaction ($r = -.175$, $p < .001$), bingeing ($r = -.305$, $p < .001$), and purging ($r = -.423$, $p < .001$).

These results revealed that positive attitudes toward physical activity are inversely associated with eating disorder-related behaviors.

The results of the model adaptation evaluation of the data collection tools for positive attitudes toward physical activity and eating disorders are presented in Table 3. According to the evaluation model, positive attitudes toward physical activity values were distributed between $\beta = 0.611$ and $\beta = 0.885$, whereas eating disorders items were significantly distributed between $\beta = 0.748$ and $\beta = 0.916$ ($p < .001$). The adaptation index values of the model were $\chi^2 = 510$, $df = 155$, $p < .001$, CFI=0.958, TLI=0.948, GFI=0.925, SRMR=0.044, and RMSEA=0.061, which are within acceptable limits (Kline, 2015). The average variance extracted (AVE) values were PAPA=0.583, ER=0.740, SWOE=0.816,

Table 4 The modulatory role analysis results of gender on the association between positive attitudes toward physical activity and eating disorders

	Estimate	SE	Z	P	95% Confidence Interval	
					Lower	Upper
PAPA	-0.437	0.0711	-6.15	<0.001	-0.5767	-0.2980
Gender	-0.237	0.1127	-2.10	0.035	-0.4578	-0.0162
PAPA* Gender	0.340	0.1423	2.39	0.017	0.0611	0.6189
Low (-1SD)	-0.607	0.0935	-6.50	<0.001	-0.791	-0.4241
High (+1SD)	-0.267	0.1079	-2.48	0.013	-0.479	-0.0560

**Fig. 1** Results of path analysis

BD=0.747, B=0.688, $P=.727$, and the composite reliability (CR) values were PAPA=0.906, ER=0.895, SWOE=0.898, BD=0.854, B=0.868, $P=.888$. According to Fornell and Larcker [55], an $AVE \geq 0.50$ and a $CR \geq 0.70$ indicate the reliability of the evaluation model. Therefore, our evaluation model was reliable. The internal reliability coefficient values were positive attitudes toward physical $\alpha = 0.905$, eating restraint $\alpha = 0.899$, shape and weight over-evaluation $\alpha = 0.898$, body dissatisfaction $\alpha = 0.860$, bingeing $\alpha = 0.870$ and purging $\alpha = 0.883$.

The results for the prediction of positive attitudes toward physical activity and eating disorders are presented in Table 4, and the related path analysis is presented in Fig. 1. According to Table 3, positive attitudes

toward physical activity did not significantly predict eating restraint ($\beta = -0.0865$, $z = -1.94$, $p > .05$) or shape and weight over-evaluation ($\beta = -0.0836$, $z = -1.87$, $p > .05$). Path analysis revealed that positive attitudes toward physical activity were significantly and inversely associated with body dissatisfaction ($\beta = -0.1788$, $z = -3.87$, $p < .001$), bingeing ($\beta = -0.3201$, $z = -6.75$, $p < .001$), and purging ($\beta = -0.4591$, $z = -9.58$, $p < .001$). Table 4. The predictive results of positive attitudes toward physical activity on eating disorders subdimensions.

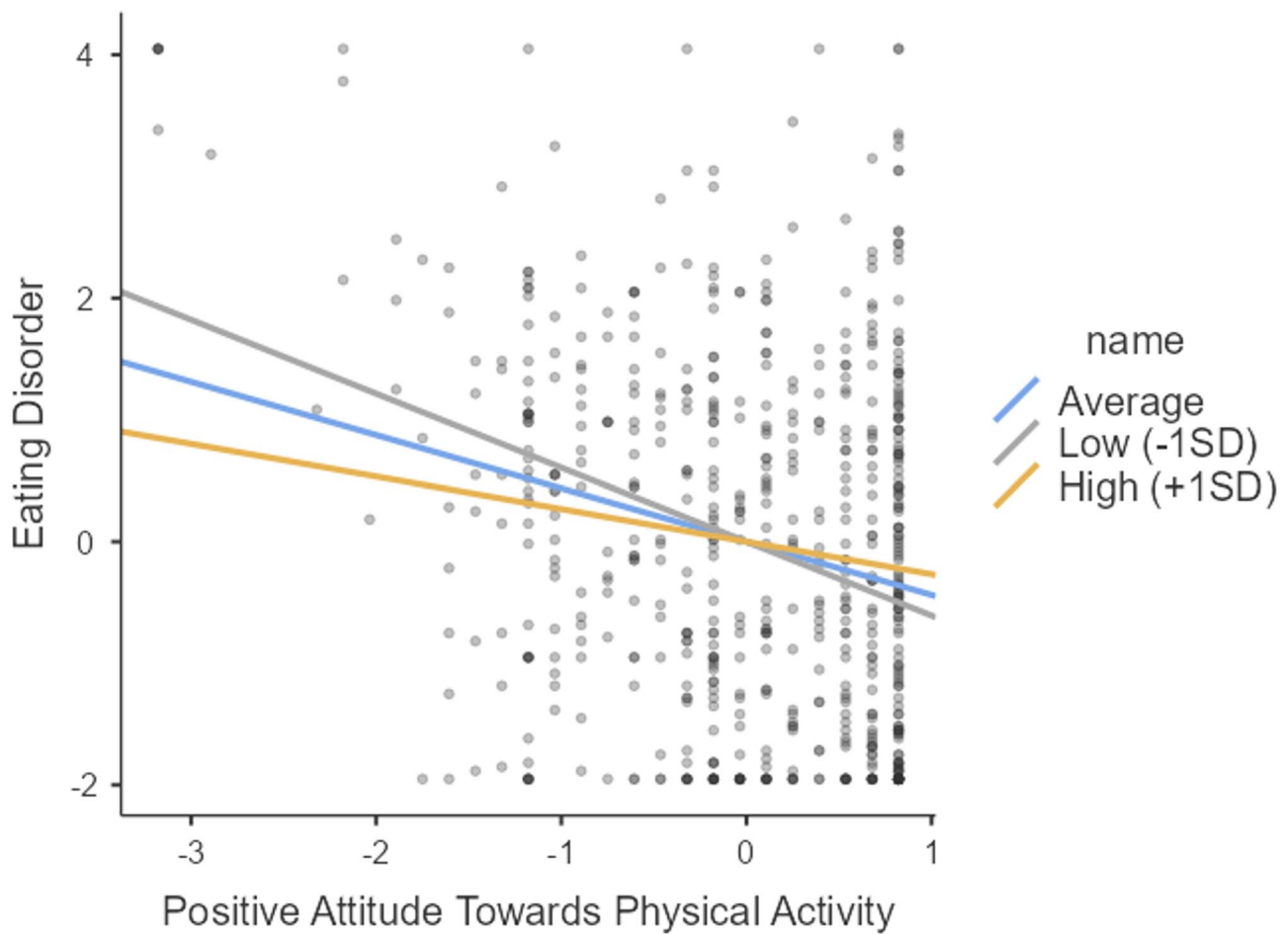


Fig. 2 Simple slope plot results

Effect	β	S.E.	Z. Value	P	95% Confidence Interval	
					Lower	Upper
PAPA→ER	-0.0865	0.0627	-1.94	0.053	-0.244	0.00154
PAPA→SWOE	-0.0836	0.0667	-1.87	0.061	-0.256	0.00577
PAPA→BD	-0.1788	0.0646	-3.87	<0.001	-0.376	-0.12307
PAPA→B	-0.3201	0.0628	-6.75	<0.001	-0.547	-0.30076
PAPA→P	-0.4591	0.0703	-9.58	<0.001	-0.811	-0.53534

Figure 1 Structural equation model illustrates direct effects of positive attitudes toward physical activity on eating disorder dimensions. Standardized coefficients are shown. The effects of gender on positive attitudes toward physical activity and eating disorders are presented in Table 4. According to the results, the main effect of positive attitudes toward physical activity on eating disorders was negative and significant ($B = -0.437, p < .001$). The direct effect of gender on eating disorders is also negative and significant ($B = -0.236, p < .05$), PAPA * The gender interaction was found to be positive and significant ($B = 0.387, p < .05$), which suggested that gender has a moderating effect on positive attitudes toward physical

activity and eating disorders. Subgroup analysis indicated that the effects of positive attitudes toward physical activity on eating disorders were stronger and negative at the -1 SD level ($B = -0.631, p < .001$) and weaker but also significant at the $+1$ SD level ($B = -0.244, p < .05$) as represented in Fig. 2 by Simple Slope analysis. Taken together, these results indicate that gender has a moderating role in the association between positive attitudes toward physical activity and eating disorders. Additionally, the interaction between PAPA and gender has a significant role in eating disorders as a dependent variable. In particular, PAPA effects on females may be weaker than those on males, depending on PAPA levels. These results indicate that gender has become an essential factor for understanding the effects of positive attitudes toward physical activity on eating disorders.

Figure 2 illustrates the moderation model examining the interaction effect of gender on the relationship between positive attitudes and eating disorder symptoms. The diagram provides a visual representation of the moderated paths and their statistical relevance.

Discussion

The present study contributes to the understanding of how positive attitudes toward physical activity are associated with specific dimensions of eating disorders among Turkish university students. Our results indicate that such attitudes are significantly related to reduced levels of body dissatisfaction, bingeing, and purging behaviors. These findings are consistent with previous studies suggesting that engaging in or valuing physical activity may serve as a protective factor against certain disordered eating behaviors. By focusing specifically on attitudes rather than actual physical activity levels, this study highlights the potential psychological and motivational dimensions underlying health-related behaviors in young adults. Furthermore, the inclusion of gender as a moderating factor adds nuance to the findings, pointing to the complex role that sociocultural and gender-based factors may play in shaping the relationship between exercise-related attitudes and eating pathology.

Our results indicated that positive attitudes toward physical activity did not significantly influence restricted eating behaviors. This finding is consistent with previous literature. For instance, Martins et al. [58] highlight that restrained eaters do not consistently exhibit counter-regulatory eating behavior following exercise or preloading, and their responses to satiety cues can be highly variable. It has also been suggested that restrained eating is not a homogenous construct, and its relationship with physical activity might differ depending on whether individuals practice flexible or rigid restraint [59]. Therefore, our findings may reflect the nuanced and multifactorial nature of restrained eating, which is not necessarily influenced by positive exercise attitudes alone.

However, exercise motivations might be determinants of this process. Nelson et al. [60] reported that attitudes toward physical activity may vary among individuals and that negative attitudes are more likely to define the possibility of exercising. These outcomes highlighted that not only positive attitudes but also life experiences might have decisive effects on exercise behaviors. Similarly, Jankauskiene and Pajaujiene [61] reported that there was no significant difference between athletes, those exercising, and sedentary female students in terms of eating disorders, body dissatisfaction, and self-esteem. These results showed that physical activity did not have a direct role in eating behaviors and that psychological and motivational factors may restructure this association. Similarly, Berman, Kerr and De Souza [62] reported that physical activity may vary depending on individual differences and does not have only one type of effect on eating disorders. In their study, some of the participants reported that physical activity is a part of life, whereas others attributed it to weight control and aesthetics.

In our study, we found that positive attitudes toward physical activity did not significantly influence body shape or weight-related concerns. These results suggest that physical activity does not always increase body concern and may vary depending on exercise motivation. Bassett-Gunter et al. [63] reported that the effects of physical activity on body perception mostly depend on thoughts related to the activity. Nottthoff et al. [64] reported that the effects of physical activity on body perception may vary according to individual diversity and exercise motivation. These results showed that exercising established body satisfaction and concerns. In addition, Kujawa et al. [65] investigated the significant relationships among psychological factors, exercise motivation, and body satisfaction to determine the effects of physical activity on body perception. LaCaille et al. [66] reported that university students' eating behaviors and body perceptions are influenced by social and psychosocial factors. In contrast to our findings, Berman et al. [62] claimed that the motivational aspects of physical activities were the main effective issue in terms of body perception. It has been suggested that people experience body concerns depending on aesthetic and health concerns. Sabiston et al. [38] reported that exercise might increase body satisfaction, whereas weight-focused exercise increases body concerns. However, Pearson and Hall [67] suggested that exercise has positive effects on body perception and enhances body appearance satisfaction. These results contradict those of some studies on the enhanced effects of physical activity on positive body perception. Moreover, physical activity has an important role in binge eating behaviors. Our study results indicated that positive attitudes toward physical activity were significantly negatively correlated with binge eating. Our study suggested that physical activity might alleviate binge eating and have modulatory effects on eating behaviors. Previous studies have suggested that physical activity might establish positive psychological effects and prevent binge eating disorders. Similar to our results, Kerrigan et al. [68] reported that physical activity has a close relationship with the psychopathology of eating disorders and might reduce binge eating frequencies. Additionally, nonmal adaptive exercise decreases binge eating habits through the enhancement of positive affectivity [69]. However, it must be noted that this association may not cover the whole population. According to Emery et al. [70], exercising may trigger energy consumption mechanisms to increase binge eating behaviors. This means that the positive effects of physical activity on eating behaviors also depend on individual motivations, habits, and psychological factors. Furthermore, physical activity has also been associated with purification behaviors. Binge eating and purging behaviors are common compensatory strategies against eating disorders. Physical activity

may sometimes act as a compensatory mechanism, and in some individuals, it works to regulate health. Therefore, physical activity and psycho-pathology may vary according to individual differences [68]. In the present study, positive attitudes toward physical activity were significantly negatively correlated with purging. It was suggested that physical activity does not work as a purging strategy; instead, it is mostly used to regulate health. Thus, our results indicate that people with positive attitudes toward physical activity do not engage in purging much. Adkins et al. [71] investigated those patients with BN who use doing over and compulsive exercise to purge out eating behaviors. This result indicated that physical activity may sometimes cause continuity in the context of an eating disorder. Lampe et al. [69] reported that maladaptive exercise behaviors may contribute to the psychopathology of eating disorders. These results suggest that physical activity could work both as a protective factor and to increase the risk of eating disorders.

The effects of positive attitudes toward physical activity on eating disorders may be influenced by individual differences and sociocultural factors. In particular, the lack of a significant association between such attitudes and restrictive eating in our study may be better understood within the Turkish sociocultural context. University students in Türkiye specially women are frequently exposed to intense societal pressures related to academic achievement and body image, which may override the potential protective effects of positive physical activity attitudes [16, 19]. In addition, gender-specific factors such as anxiety and body dissatisfaction may shape the relationship between physical activity and eating behaviors [20].

Our findings further support the role of gender as a moderating variable. Specifically, the relationship between positive attitudes toward physical activity and eating disorder symptoms appeared stronger in males than in females. This pattern may reflect gendered differences in exercise motivation: while females are often driven by concerns about thinness, weight control, and social acceptance, males are more commonly motivated by goals such as muscularity, strength, and athletic performance [72, 73]. Supporting this, Beaulieu and Best [59] found that the type of physical activity and its psychological implications differ by gender, and that gender significantly shapes the association between physical activity and eating disorder tendencies. Therefore, it is clear from these studies that different aims across physical activities lead to differences in eating behaviors. For example, weight control-focused exercise may avoid binge eating; however, muscularization motivation might have its own eating dynamics, mostly increased eating habits. Overall, gender variables play a key role in defining the main effects of physical activity on eating disorders. Nevertheless, it should be kept in mind that people

might have various risk factors depending on exercise motivation.

Conclusion

This study investigated positive attitudes toward physical activity and their associations with eating disorder symptoms among Turkish university students, and indicated that individual attitudes may be important determinants of disordered eating behaviors. Our results showed that positive attitudes toward physical activity did not significantly affect consumption of restraint, body shape, or weight over-evaluation. However, positive attitudes toward physical activity may have alleviating effects on body dissatisfaction, bingeing, and purging. Additionally, gender has to be found to have a modulatory role in the mentioned behaviors, and positive attitudes toward physical activity might have different effects on females and males. It was also suggested that positive attitudes toward physical activity might have a protective role against eating disorders; however, individual diversity, gender-based motivations, and psychosocial factors might influence the outcomes. Overall, an understanding of the associations between physical activity and eating behavior, individual diversity, and social factors should essentially be noted.

Suggestions

- Considering the important role of physical activity in eating behaviors and motivational diversity in physical activity, health-promoting exercise programs could be developed, and the undesired effects of weight and aesthetic concern-based exercise might be avoided.
- The influence of sex on physical activity associated with eating disorders should be noted. Therefore, personalized exercise programs and motivational strategies could be established.
- Further studies are needed to elucidate the relationships among physical activity, eating disorders, body perception, self-esteem, and stress factors.
- Soon thereafter, different motivational techniques for physical activities might be developed, and psychosocial factors could be investigated in detail.

Limitations

- The data included only university students, limiting the generalizability of the results to different ages and a large population.
- The effects of cultural diversity on positive attitudes toward physical activity and eating behaviors were not handled, so it must be noted that the results may differ on the basis of cultural diversity.

- In this study, no distinction was made between athletic students and individuals who do not exercise regularly, which constitutes limitations that may cause different evaluations of attitudes toward physical activity.
- The data collection method is based mainly on self-reports, which is another limitation that may lead to social desirability bias and may affect the accuracy of participant responses.

Abbreviations

AN	Anorexia Nervosa
BN	Blumia Nervosa
BED	Binge Eating Disorders
BMI	Body Mass Index
PAPA	Positive Attitudes Towards Physical Activity
ED	Eating Disorders
ER	Eating Restraint
SWOE	Shape and Weight Over-Evaluation
BD	Body Dissatisfaction
B	Bingeing
P	Purging
AVE	Average Variance Extracted
CR	Composite reliability

Acknowledgements

Not applicable.

Author contributions

All the authors contributed equally to the experimental process, manuscript writing, and editing.

Funding

This study did not receive any funding from a company.

Data availability

Data are, however, available from the authors upon reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by the Tokat Gaziosmanpaşa University Social and Human Sciences Ethics Committee, with 10.12.2024/01–52 date and number ethical approval.

Consent for publication

The consent for publication was obtained.

Competing interests

The authors declare no competing interests.

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Published online: 11 August 2025

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Received: 16 March 2025 / Accepted: 1 August 2025

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