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Multigroup Analysis of the Relationships Between Self Efficacy and Academic Anxiety: The Mediating Role of Psychological Flexibility Across Gender in Adolescent Students

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A B S T R A C T

Purpose: The present study aimed to examine the multigroup model of the relationships between self-efficacy and academic anxiety with the mediating role of psychological flexibility based on gender among adolescent students.

Materials and Methods: This study was a descriptive–correlational and cross-sectional research using structural equation modeling and multi group analysis (MGA). The statistical population consisted of all male and female adolescent students studying in the fields of experimental sciences, mathematics, and humanities in Tehran from November to December 2024. The sample included 121 adolescents (56 boys and 65 girls) who were selected through multistage cluster sampling. The research instruments included the General Self Efficacy Scale (GSE 17), the Psychological Flexibility Questionnaire (PFQ), and the Academic Performance Questionnaire (APQ). Descriptive statistics were analyzed using SPSS version 27, and path analysis and multi group analysis (MGA) were conducted using SmartPLS version 4. The significance level was set at 0.05.

Findings: The findings indicated that the path from psychological flexibility to debilitating anxiety was negative and significant among girls ($\beta = -0.455$, $p < 0.001$) but not significant among boys ($\beta = 0.258$, $p = 0.463$). Psychological flexibility was positively and significantly related to facilitating anxiety among girls ($\beta = 0.508$, $p < 0.001$), whereas this relationship was not significant among boys ($\beta = 0.330$, $p = 0.121$). The path from self-efficacy to debilitating anxiety was negative and significant among girls ($\beta = -0.562$, $p < 0.001$) and negative but not significant among boys ($\beta = -0.589$, $p = 0.062$). Furthermore, the relationship between self-efficacy and facilitating anxiety was positive and significant among boys ($\beta = 0.519$, $p = 0.016$) but not significant among girls ($\beta = 0.220$, $p = 0.126$). The results also showed that the path from self-efficacy to psychological flexibility was positive and significant in both groups (girls: $\beta = 0.741$, $p < 0.001$; boys: $\beta = 0.903$, $p < 0.001$), with a significant difference between the two groups ($p = 0.012$). In addition, the indirect effects of self-efficacy on debilitating anxiety ($\beta = -0.337$, $p < 0.001$) and facilitating anxiety ($\beta = 0.376$, $p < 0.001$) through psychological flexibility were significant only among girls and were not significant among boys ($p > 0.05$).

Conclusion: The findings suggest that psychological flexibility plays a significant role in explaining the relationship between self-efficacy and academic anxiety among adolescents, and that these relationships differ by gender. These findings highlight the importance of strengthening self-efficacy and especially enhancing psychological flexibility as potential strategies for managing academic anxiety among students, particularly girls. Moreover, considering gender differences in designing educational and psychological interventions may help improve adolescents' mental health and academic functioning.

Keywords: *Self efficacy, Academic anxiety, Psychological flexibility, Adolescent students*

1. Introduction

Academic anxiety is recognized as one of the most prevalent psychological challenges affecting adolescents in educational settings and has become an increasingly important concern in contemporary educational psychology. Academic anxiety, particularly examination anxiety, influences students' cognitive performance, emotional well-being, academic motivation, and long-term educational outcomes. Adolescence represents a critical developmental period characterized by heightened emotional sensitivity, identity formation, and increased academic expectations, making adolescents particularly vulnerable to stress-related educational difficulties. Excessive academic anxiety has been associated with impaired concentration, reduced memory performance, cognitive interference, emotional exhaustion, and lower academic achievement. Furthermore, persistent anxiety during adolescence may negatively affect self-esteem, interpersonal relationships, and psychological adjustment in adulthood. Accordingly, researchers have emphasized the importance of identifying psychological factors that may either intensify or alleviate academic anxiety among students (Dogan, 2024; Ghasemi et al., 2024; Habib Zadeh et al., 2024). The present study addresses this issue by focusing on self-efficacy and psychological flexibility as two important psychological resources that may explain variations in academic anxiety among adolescent students.

Self-efficacy has been consistently identified as one of the strongest psychological predictors of adaptive academic functioning. Rooted in social cognitive theory, self-efficacy refers to individuals' beliefs regarding their capability to organize and execute behaviors necessary to achieve desired outcomes. Students with strong self-efficacy beliefs tend to perceive difficult educational tasks as manageable challenges rather than threatening situations, whereas students with low self-efficacy are more likely to experience helplessness, avoidance behaviors, and anxiety in academic contexts. High self-efficacy is associated with persistence, self-regulation, resilience, and effective coping strategies, all of which contribute to improved academic functioning and emotional adjustment. Research has demonstrated that adolescents with higher levels of self-efficacy show greater confidence in their academic abilities, stronger engagement in learning activities, and lower vulnerability to emotional distress (Asgarshyan et al., 2023; Chen et al., 2023; Khaleghi et al., 2023). In particular, Javadi and Ghanifar reported that self-efficacy training significantly reduced test anxiety and improved school belonging among male high school students, suggesting that efficacy beliefs play a central role in shaping emotional responses to academic situations (Javadi & Ghanifar, 2024). Similarly, Naseri et al. demonstrated that self-efficacy predicts lower entrance examination anxiety through emotion regulation mechanisms, indicating that efficacy beliefs may indirectly influence anxiety by promoting adaptive emotional processes (Naseri et al., 2025). These findings suggest that self-efficacy not only affects academic performance directly but also contributes to adolescents' emotional resilience in stressful educational environments.

Recent research has increasingly emphasized that the effects of self-efficacy on academic adjustment are not merely direct but may operate through multiple mediating psychological mechanisms. One of the most important constructs in this regard is psychological flexibility. Psychological flexibility refers to the ability to remain aware of present experiences, accept difficult thoughts and emotions without excessive avoidance, and continue engaging in goal-directed behaviors consistent with personal values. This construct is central to acceptance-based psychological approaches and has gained considerable attention in studies of adolescent mental health and academic functioning. Adolescents with high psychological flexibility are more capable of adapting to stressful situations, regulating emotional reactions, and responding constructively to academic challenges. Conversely, low psychological flexibility is associated with experiential avoidance, cognitive rigidity, emotional dysregulation, and anxiety symptoms (Dogan, 2024; Sharma & Kumra, 2022). Ding et al. demonstrated that psychological flexibility is positively associated with school mental health and adaptive functioning over time, emphasizing its role as a protective

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psychological factor among students (Ding et al., 2024). Likewise, Raeisi Sarteshneizy et al. found that self-efficacy and cognitive flexibility jointly predict lower emotional distress among university students, indicating that flexible psychological processes may strengthen the beneficial effects of efficacy beliefs (Raeisi Sarteshneizy et al., 2020). In addition, Kan and Demir reported that cognitive flexibility mediates the relationship between perfectionism and anxiety in adolescents, suggesting that flexible cognitive and emotional processing can reduce maladaptive anxiety responses (Kan & Demir, 2025). These findings collectively support the assumption that psychological flexibility may function as a mediating mechanism linking self-efficacy to academic anxiety.

Academic anxiety itself is a multidimensional construct that includes both facilitating and debilitating components. Facilitating anxiety refers to moderate levels of arousal that may enhance motivation and performance, whereas debilitating anxiety interferes with concentration, memory, and academic functioning. Previous studies have demonstrated that the psychological antecedents and consequences of these two forms of anxiety may differ considerably. Habib Zadeh et al. showed that students' motivational profiles are associated with different patterns of examination anxiety, suggesting that adaptive motivational characteristics may transform anxiety into a facilitative rather than debilitating experience (Habib Zadeh et al., 2024). Similarly, Khaleghi et al. developed a structural model indicating that thinking styles and learning styles influence examination anxiety through academic self-efficacy (Khaleghi et al., 2023). These findings indicate that academic anxiety cannot be fully understood without considering students' psychological beliefs, cognitive styles, and adaptive regulatory capacities. Furthermore, Hasani emphasized that maladaptive emotion regulation strategies are closely associated with increased test anxiety among students, highlighting the importance of psychological regulation processes in academic emotional experiences (Hasani, 2014). Contemporary intervention studies also support this perspective. For example, Mousavi et al. demonstrated that emotional schema therapy improved self-regulation and frustration tolerance among female students with exam anxiety (Mousavi et al., 2024). Likewise, Salari Poor et al. found that interventions such as mandala coloring can reduce test anxiety and improve working memory performance among students (Salari Poor et al., 2024). Rostami et al. also reported that self-encouragement training and confrontational CAT interventions significantly reduced social and examination anxiety among students (Rostami et al., 2024). Collectively, these findings indicate that adaptive psychological processes may reduce maladaptive anxiety and promote healthier academic functioning.

In addition to individual psychological variables, contemporary studies increasingly emphasize the role of contextual and interpersonal factors in adolescents' emotional and academic development. Educational support systems, peer relationships, parenting behaviors, and school climate all contribute to adolescents' self-regulatory capacities and emotional well-being. Chen et al. demonstrated that perceived parenting behaviors and teacher support mediate the relationship between adolescents' need for cognition and creative self-efficacy (Chen et al., 2023). Similarly, Cui et al. showed that teacher and peer support influence adolescents' emotional experiences and engagement through motivational goals, emphasizing the importance of social and educational contexts in shaping psychological adjustment (Cui et al., 2026). Harma et al. further reported that behavioral parental control predicts academic self-efficacy and adjustment among adolescents, whereas psychological control is associated with maladaptive outcomes (Harma et al., 2025). These findings suggest that adolescents' academic anxiety emerges within a broader psychosocial context involving interactions between personal beliefs and environmental influences. Moreover, Cheng et al. proposed a longitudinal model showing that self-efficacy, regulation processes, and anxiety interact dynamically during academic development (Cheng et al., 2026). Such evidence highlights the need for integrative models that simultaneously examine personal and regulatory factors associated with academic anxiety.

Another important factor in understanding academic anxiety is gender. Research consistently demonstrates that adolescent girls and boys differ in emotional processing, emotion regulation, anxiety experiences, and coping styles. Girls often report higher levels of internalizing symptoms such as anxiety and emotional distress, whereas boys may exhibit different emotional expression patterns or coping mechanisms. Sanchis-Sanchis et al. found significant gender differences in emotion regulation processes among children and adolescents, indicating that girls and boys employ different strategies for managing emotions (Sanchis-Sanchis et al., 2020). Likewise, Syamsuyurnita et al. emphasized that psychological processes associated with anxiety reduction may function differently across groups in multigroup structural models (Syamsuyurnita et al., 2023). Li et al. also reported significant gender-based differences in the

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structural relationships among peer support, resilience, and adaptive behavioral outcomes in adolescents (Li et al., 2025). Similarly, Xia et al. demonstrated that resilience mediates psychological adjustment differently depending on contextual and family-related variables (Xia et al., 2024). In the domain of academic anxiety specifically, Naseri et al. found that the pathways linking self-efficacy, emotion regulation, and entrance examination anxiety vary between boys and girls (Naseri et al., 2025). Öztürk et al. also highlighted that self-regulatory mechanisms and efficacy beliefs interact differently with mathematics anxiety depending on contextual and individual characteristics (Ozturk et al., 2026). These findings suggest that gender differences should not be overlooked when examining the psychological mechanisms underlying academic anxiety among adolescents.

Another important line of research concerns the relationship between resilience, physical activity, adaptive functioning, and self-efficacy in adolescence. Peng et al. demonstrated that psychological resilience mediates the relationship between physical exercise and self-efficacy among adolescents, suggesting that adaptive psychological resources reinforce one another in developmental contexts (Peng et al., 2025). Similarly, Xia et al. reported that resilience mediates the relationship between physical exercise and psychological security among junior high school students (Xia et al., 2024). These findings reinforce the broader theoretical assumption that psychological functioning in adolescence depends on interconnected systems of cognitive, emotional, and behavioral adaptation. Therefore, examining self-efficacy and psychological flexibility together may provide a more comprehensive understanding of adolescents' academic emotional experiences than studying each construct independently.

Despite the substantial literature on self-efficacy, anxiety, and adaptive psychological processes, several important gaps remain in existing research. First, relatively few studies have simultaneously examined self-efficacy, psychological flexibility, and academic anxiety within a single integrative structural model. Second, although gender differences in anxiety and emotional regulation have been widely acknowledged, limited research has explored whether the mediating role of psychological flexibility differs between boys and girls. Third, many previous studies have focused either on intervention outcomes or direct relationships among variables without examining the underlying mediational mechanisms that may explain how efficacy beliefs influence academic emotional experiences. Finally, relatively limited evidence exists regarding these relationships among adolescent students within educational settings characterized by intense academic competition and examination pressure. Addressing these gaps may improve theoretical understanding of academic anxiety and contribute to the development of more targeted educational and psychological interventions for adolescents.

Accordingly, the present study aimed to investigate the multigroup relationships between self-efficacy and academic anxiety with the mediating role of psychological flexibility across gender among adolescent students.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a descriptive–correlational design with a cross sectional approach and utilized structural modeling along with multi group analysis (MGA). In this research, self efficacy was considered the independent variable, academic anxiety the dependent variable, and psychological flexibility the mediating variable. Academic anxiety consisted of two components: facilitating anxiety and debilitating anxiety.

The statistical population included all male and female adolescent students studying in the fields of experimental sciences, mathematics, and humanities in Tehran, Iran, between November and December 2024. The initial sample consisted of 150 adolescents (75 boys and 75 girls) who were selected using a multistage cluster sampling method. Sample size adequacy was determined based on Cohen's (2013) formula for estimating sample size in structural equation modeling (SEM), considering the number of observed and latent variables in the model, the anticipated effect size, and the desired probability and statistical power levels (Cohen, 2013). According to this formula, the following parameters were considered: anticipated effect size = 0.25, desired statistical power level = 0.80, number of latent variables = 4, number of observed variables = 60, and probability level = 0.01. Based on these parameters, the required sample size was estimated to be 119 participants. Considering the possibility of participant attrition, the researcher increased the sample size and selected 150 participants as the initial sample.

The inclusion criteria were being a high school student in the adolescent age range (15–18 years), studying in one of the academic fields of experimental sciences, mathematics and physics, or humanities in Tehran, willingness to participate in the study and voluntarily complete the

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questionnaires, and the ability to understand the questionnaire items. The exclusion criteria included incomplete questionnaires, random responses to questionnaire items, withdrawal from participation at any stage of the study, or failure to complete the measurement instruments.

The research procedure was conducted as follows. First, the necessary permissions were obtained from the researcher's affiliated university. Tehran was then divided according to its 22 municipal districts, and districts 3, 5, 6, 7, 13, and 19 were randomly selected. Subsequently, one high school was randomly selected from each district, resulting in a total of six schools, including three boys' schools and three girls' schools. After coordinating with the school administrations, one class from the upper secondary level in each school was randomly selected. From each class, a number of students were randomly chosen in proportion to the required sample size. Data collection in the schools lasted approximately one month.

Out of the 150 completed questionnaires, 121 were retained for analysis. Twenty nine questionnaires were excluded due to incomplete responses or deliberate errors in answering the items. Based on the demographic results related to gender, among the 121 participants, 56 students (46.3%) were boys and 65 students (53.7%) were girls, indicating a slightly higher proportion of female participants. The questionnaires were administered in person using a self report format. To adhere to ethical research principles, students were assured that the research forms did not include any identifying personal information, and they were informed that they could withdraw from participation at any time if they did not wish to continue.

2.2. Data Collection Tools

General Self-Efficacy Scale (GSE-17): In 1982, Sherer & Maddux developed this survey (Sherer, Maddux, Mercandante, Prentice-Dunn, Jacobs, Rogers, 1982). The GSE-17 survey assesses individuals' overall self-efficacy. It consists of 17 questions, with responses rated on a four-point Likert scale from strongly disagree to strongly agree. The scale evaluates three aspects of behavior: the initiation, the persistence, and the effort. Scores on this scale range from 17 to 68. A study conducted in Iran found the internal consistency of the survey to be 0.83) Ahmadi Deh Ghotbaddini, 2022). Additionally, the researcher calculated Cronbach's alpha to be 0.766. The questionnaire also demonstrated a convergent validity of 0.787.

The Psychological Flexibility Questionnaire was developed by Ben Itzhak and colleagues in 2014 to assess psychological flexibility in individuals (Ben Itzhak, Bluvstein, & Maor, 2014). The questionnaire consists of 24 items and five subscales. These subscales include: positive interpretation of change, perceiving oneself as a flexible person, perceiving oneself as an open and creative person, interpreting reality as dynamic and changeable, and interpreting reality as multidimensional. Items are rated on a six point Likert scale ranging from 1 (never) to 6 (very much). The total score of the Psychological Flexibility Questionnaire ranges from 24 to 144, with higher scores indicating greater psychological flexibility in the respondent. The reliability of the scale, assessed using Cronbach's alpha by the original developers, was reported to be 0.91. In another study, the reliability of the scale based on Cronbach's alpha ranged from 0.77 to 0.89 (Ameri, Mehrinejad, Khodabakhsh, & Peivastegar, 2020).

The Academic Anxiety Questionnaire was developed by Alpert and Haber to assess academic anxiety and achievement related anxiety (Alpert & Haber, 1960; 1963). This self report instrument consists of 19 items rated on a five point Likert scale. The questionnaire includes two subscales: facilitating anxiety, which assesses motivating or activating anxiety, and debilitating anxiety, which evaluates anxiety that interferes with performance. Separate scores are calculated for each subscale. The facilitating anxiety subscale includes items 2, 6, 8, 9, 10, 12, 15, 16, and 18 (nine items), whereas the debilitating anxiety subscale includes items 1, 3, 4, 5, 7, 11, 13, 14, 17, and 19 (ten items). Reverse scored items include 3, 4, 8, 10, 12, 13, 17, and 19 (i.e., always = 1 and never = 5). The score ranges from 9 to 45 for the facilitating anxiety subscale and from 10 to 50 for the debilitating anxiety subscale. Subscale scores are obtained by summing the responses to the items belonging to each subscale. In this questionnaire, higher scores indicate higher levels of academic anxiety. Therefore, higher total scores reflect greater anxiety associated with academic activities, and vice versa. The validity of the questionnaire has been supported through its correlation with the Test Anxiety Scale ($r = 0.51$, $p < 0.001$). The reliability of the questionnaire was reported using Cronbach's alpha and split half methods as 0.80 and 0.81, respectively, indicating good internal consistency. In another study, the Cronbach's alpha reliability coefficient was reported as 0.87. Furthermore, research conducted in Iran reported a Cronbach's alpha of 0.86 for this questionnaire (Pakravan, 2024).

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2.3. Data Analysis

SPSS version 27 was used for descriptive statistics, while SmartPLS version 4 was employed for path analysis between variables and Multi-Group Analysis (MGA). The Shapiro–Wilk test was used to examine the normality of the distribution of the research variables. Since the results of this test were significant for the study variables, the data were considered non-normally distributed; therefore, SmartPLS was utilized for the analyses. Partial Least Squares Structural Equation Modeling (PLS-SEM) was applied to investigate the relationships among the research variables due to the non-normal distribution of the data. Multi-Group Analysis (MGA) was conducted to examine significant differences in structural relationships between the two study groups. The permutation test was used as an assumption test to assess the invariance of variances and means between groups in PLS analysis. The Welch–Satterthwaite test was employed to compare the means of the two groups under conditions of unequal variances and sample sizes. In addition, the Mann–Whitney U test was used to examine differences between the groups. The significance level was set at 0.05.

3. Findings and Results

As shown in Table 1, the distribution of demographic variables did not differ significantly between male and female students. The highest frequency in both groups was observed in the age range of 15–16 years (boys: n = 25, 44.6%; girls: n = 40, 61.5%), with no significant difference between the groups (U = 1536.5, p = 0.101). Regarding the field of study, mathematics had the highest frequency in both groups (boys: n = 33, 58.9%; girls: n = 38, 58.5%), and no significant difference was found (U = 1816.0, p = 0.981).

For fathers' education, the most frequent level in both groups was an associate degree (boys: n = 24, 42.9%; girls: n = 40, 61.5%), with no significant difference between groups (U = 1663.0, p = 0.371). Similarly, no significant difference was observed for mothers' education (boys: associate degree: n = 25, 44.6%; girls: bachelor's degree: n = 30, 46.2%; U = 1605.0, p = 0.221).

Table 1

Description of Demographic Variables

Variable		Boy		Girl		Mann-Whitney U	p
	Categories	N	%	N	%		
Age	15-16	25	44.6%	40	61.5%	1536.5	0.101
	16-17	23	41.1%	17	26.2%		
	17-18	8	14.3%	8	12.3%		
Field of Study	Mathematics	33	58.9%	38	58.5%	1816.0	0.981
	Experimental Sciences	11	19.6%	14	21.5%		
	Humanities	12	21.4%	13	20.0%		
Father's Educational Level	Diploma	15	26.8%	15	23.1%	1663.0	0.371
	Associate Degree	24	42.9%	40	61.5%		
	Bachelor's Degree	11	19.6%	7	10.8%		
	Master's Degree and Higher	6	10.7%	3	4.6%		
Mother's Educational Level	Diploma	9	16.1%	6	9.2%	1605.0	0.221
	Associate Degree	25	44.6%	28	43.1%		
	Bachelor's Degree	22	39.3%	30	46.2%		
	Master's Degree and Higher	0	0.0%	1	1.5%		

Table 2

Description of research variables

Variable	Groups	Mean	SD	Mann-Whitney U		
				U	p	Z
Self-Efficacy	Boy	44.464	7.281	1659.0	0.401	-.839
	Girl	43.446	7.246			
psychological flexibility	Boy	82.732	10.459	1635.5	0.337	-.960
	Girl	84.862	12.601			
Facilitating Anxiety	Boy	28.679	4.768	1596.0	0.243	-1.167
	Girl	30.169	6.758			
Debilitating Anxiety	Boy	29.661	5.395	816.5	P<0.001	-5.229
	Girl	36.492	7.011			

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As shown in Table 2, no significant difference was found between girls and boys in Self Efficacy, with mean scores of 44.4 for boys and 43.4 for girls (U = 1659.0, p = 0.401). Similarly, no significant difference was observed between the two groups in Psychological Flexibility, with mean scores of 82.732 for boys and 84.862 for girls (U = 1635.5, p = 0.337). Regarding Facilitating Anxiety, the results also indicated no significant difference between boys (M = 28.679) and girls (M = 30.169) (U = 1596.0, p = 0.243). However, a significant difference was observed in Debilitating Anxiety, with girls reporting a higher mean score (M = 36.492) than boys (M = 29.661), and this difference was statistically significant (U = 816.5, p < 0.001).

Table 3

Similarity results with Permutation test

step	step 1. configural invariance	Step 2. compositional invariance	Step 3. equality of means/variance			
Variable		Permutation p value	Permutation mean difference	Permutation p value	Permutation mean difference	Permutation p value
Self-Efficacy	Yes	0.252	0.958	P<0.001	0.527	P<0.001
psychological flexibility	Yes	P<0.001	0.252	0.185	0.700	P<0.001
Facilitating Anxiety	Yes	P<0.001	0.183	0.318	0.375	0.014
Debilitating Anxiety	Yes	0.032	-0.141	0.478	-0.007	0.972

As shown in Table 3, the results of the measurement invariance assessment using the MICOM procedure with the permutation test are presented. In the first step, configural invariance was confirmed for all constructs, indicating that the model structure was identical across the girls' and boys' groups. In the second step, the results for compositional invariance showed that for Self-Efficacy the p-value was 0.252, indicating that compositional invariance was established for this construct. However, for Psychological Flexibility (p < 0.001), as well as Facilitating Anxiety and Debilitating Anxiety, the obtained p-values indicated that compositional invariance was not supported.

In the third step, the assessment of equality of means and variances indicated significant differences between the two groups for some constructs. Because measurement invariance was not fully established, the Welch–Satterthwaite test in the PLS software was used to examine the path differences between groups. After estimating the model, the path coefficients and their significance levels among the research variables were obtained and are reported in Table 4. In this study, the bootstrap procedure was conducted with 5000 resamples.

Table 4

Standard research coefficients

path between variables	Path (Boy)	p value (Boy)	Path (Girl)	p value (Girl)	Difference (Boy - Girl)	p value (Boy vs Girl)	Result
Psychological flexibility -> Debilitating Anxiety	0.258	0.463	-0.455	P<0.001	-0.712	0.048	confirmation
Psychological flexibility -> Facilitating Anxiety	0.330	0.121	0.508	P<0.001	0.177	0.480	rejection
Self-Efficacy -> Debilitating Anxiety	-0.589	P<0.001	-0.562	P<0.001	0.028	0.931	rejection
Self-Efficacy -> Facilitating Anxiety	0.519	0.016	0.220	0.126	-0.299	0.249	rejection
Self-Efficacy -> Psychological flexibility	0.903	P<0.001	0.741	P<0.001	-0.162	0.012	confirmation
Indirect Effects							
Self-Efficacy -> Psychological flexibility -> Debilitating Anxiety	0.233	0.469	-0.337	P<0.001	-0.570	0.063	rejection
Self-Efficacy -> Psychological flexibility -> Facilitating Anxiety	0.298	0.134	0.376	P<0.001	0.078	0.694	rejection

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Figure 1

Path coefficients between variables and significance level in the Boy's group

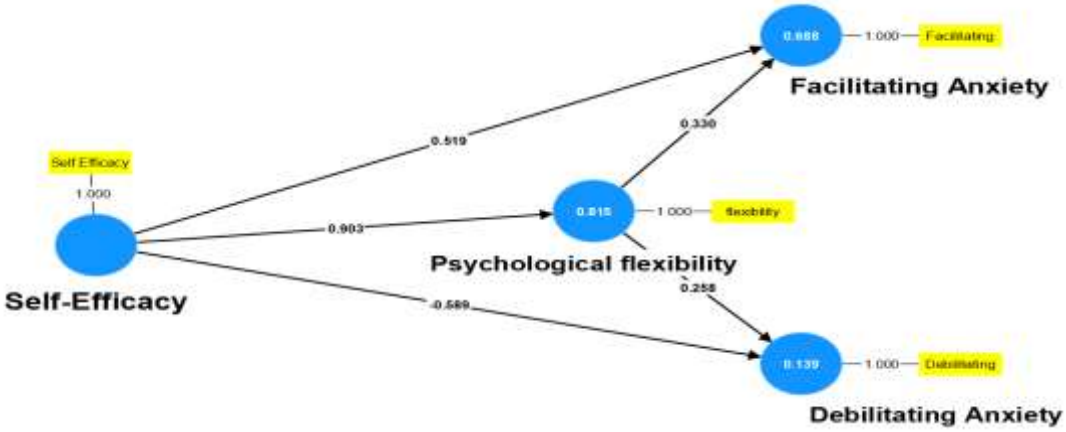
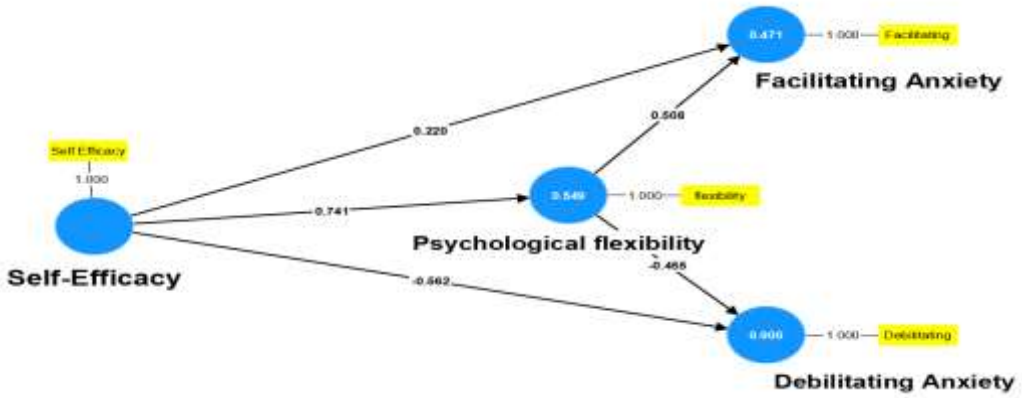


Figure 2

Path coefficients between variables and significance level in the Girl's group



Based on the results presented in Table 4 and Figures 2 and 3, Psychological Flexibility showed a significant negative effect on Debilitating Anxiety among girls ($\beta = -0.455$, $p < 0.001$), whereas the corresponding path was non-significant in boys ($\beta = 0.258$, $p = 0.463$), with a significant group difference ($\Delta = -0.712$, $p = 0.048$). Psychological Flexibility also showed a significant positive effect on Facilitating Anxiety in girls ($\beta = 0.508$, $p < 0.001$), while this path was non-significant in boys ($\beta = 0.330$, $p = 0.121$), and no significant between-group difference was observed.

Self-Efficacy negatively predicted Debilitating Anxiety among girls ($\beta = -0.562$, $p < 0.001$) but not boys ($\beta = -0.589$, $p = 0.062$), whereas it positively predicted Facilitating Anxiety only in the boys' group ($\beta = 0.519$, $p = 0.016$). The path from Self-Efficacy to Psychological Flexibility was positive and significant in both groups (girls: $\beta = 0.741$, $p < 0.001$; boys: $\beta = 0.903$, $p < 0.001$), with a significant group difference ($\Delta = -0.162$, $p = 0.012$).

Furthermore, as shown in Table 5, the indirect effects of Self-Efficacy on Debilitating Anxiety ($\beta = -0.337$, $p < 0.001$) and Facilitating Anxiety ($\beta = 0.376$, $p < 0.001$) through Psychological Flexibility were significant only among girls.

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Table 5

Coefficient of determination of the model and reliability and validity

Girl		Boy		
R-square adjusted	R-square	R-square adjusted	R-square	Variables
0.897	0.900	0.107	0.139	Debilitating Anxiety
0.454	0.471	0.676	0.688	Facilitating Anxiety
0.542	0.549	0.812	0.815	Psychological flexibility
Reliability and validity of the model				
AVE	Composite Reliability	Cronbach's Alpha		Variables
0.560	0.762	0.740		Debilitating Anxiety
0.548	0.738	0.723		Facilitating Anxiety
0.551	0.809	0.795		Psychological flexibility
0.586	0.720	0.715		Self-Efficacy
Model Fit				
NFI		SRMR		Model Fit Indices
0.901		0.064		

Table 5 presents the coefficients of determination along with the reliability and validity indices of the model. For Debilitating Anxiety, the adjusted R^2 was 0.897 in girls, whereas in boys the R^2 and adjusted R^2 were 0.139 and 0.107, respectively. For Facilitating Anxiety, the R^2 and adjusted R^2 values were 0.471 and 0.454 in girls and 0.688 and 0.676 in boys. For Psychological Flexibility, the R^2 and adjusted R^2 values were 0.549 and 0.542 in girls and 0.815 and 0.812 in boys, indicating adequate explanatory power for the endogenous variables.

Reliability and validity assessments also supported the adequacy of the measurement model. Cronbach's alpha values for Debilitating Anxiety, Facilitating Anxiety, Psychological Flexibility, and Self-Efficacy were 0.740, 0.723, 0.795, and 0.715, respectively. Composite reliability ranged from 0.720 to 0.809, and the average variance extracted (AVE) ranged from 0.548 to 0.586, indicating satisfactory reliability and convergent validity. Furthermore, the model fit indices indicated a good overall model fit (SRMR = 0.064, NFI = 0.901).

4. Discussion and Conclusion

The present study investigated the multigroup relationships between self-efficacy and academic anxiety with the mediating role of psychological flexibility among adolescent students based on gender. Overall, the findings demonstrated that self-efficacy was positively associated with psychological flexibility in both boys and girls. In addition, psychological flexibility was negatively related to debilitating anxiety and positively related to facilitating anxiety among girls, whereas these relationships were not significant among boys. The findings also revealed that self-efficacy negatively predicted debilitating anxiety among girls and positively predicted facilitating anxiety among boys. Furthermore, psychological flexibility significantly mediated the relationship between self-efficacy and both forms of academic anxiety only in the female group. These findings provide important evidence regarding the complex psychological mechanisms underlying academic anxiety during adolescence and emphasize the importance of considering gender differences when examining emotional and motivational processes in educational settings.

One of the central findings of the study was the strong positive relationship between self-efficacy and psychological flexibility in both gender groups. This result is theoretically consistent with social cognitive perspectives suggesting that individuals who possess strong efficacy beliefs are more likely to approach stressful situations with adaptive coping strategies, persistence, and cognitive openness. Adolescents with higher self-efficacy may perceive academic demands as manageable challenges rather than threatening situations, which allows them to remain psychologically flexible during stressful educational experiences. Previous empirical findings support this interpretation. For example, Chen et al. demonstrated that adolescents' self-efficacy is strengthened by supportive cognitive and educational environments and contributes to adaptive engagement in academic tasks (Chen et al., 2023). Similarly, Peng et al. reported that self-efficacy is closely associated with resilience and adaptive psychological functioning among adolescents (Peng et al., 2025). Kong et al. also emphasized that self-efficacy serves as a central motivational mechanism influencing engagement and

adaptive learning behaviors (Kong et al., 2025). Furthermore, Harma et al. showed that self-regulatory capacities and academic self-efficacy are strongly associated with adolescents' adjustment and emotional functioning (Harma et al., 2025). These findings collectively suggest that adolescents who trust their academic abilities may also develop more flexible and adaptive psychological responses when encountering academic stressors.

Another important finding concerns the role of psychological flexibility in explaining academic anxiety. The results showed that psychological flexibility reduced debilitating anxiety and increased facilitating anxiety among girls. This finding is highly consistent with acceptance-based psychological theories emphasizing that psychological flexibility enables individuals to manage distressing thoughts and emotions without excessive avoidance or maladaptive emotional reactions. Adolescents who are psychologically flexible may reinterpret examination stress as a manageable challenge rather than a catastrophic threat, thereby reducing maladaptive anxiety while maintaining adaptive motivational arousal. Previous research provides substantial support for this explanation. Doğan found that psychological flexibility was negatively associated with test anxiety and rumination among students, suggesting that flexible psychological processing reduces maladaptive emotional reactions (Dogan, 2024). Similarly, Ding et al. demonstrated that psychological flexibility contributes positively to mental health and adaptive school functioning over time (Ding et al., 2024). Kan and Demir further reported that cognitive flexibility mediates the relationship between perfectionism and anxiety in adolescents, indicating that flexible cognitive processing protects students from maladaptive anxiety responses (Kan & Demir, 2025). Raeisi Sarteshneizy et al. also found that self-efficacy and cognitive flexibility together predict lower emotional distress among students (Raeisi Sarteshneizy et al., 2020). These studies support the idea that psychological flexibility may function as a protective factor against excessive academic anxiety.

The finding that psychological flexibility was associated with facilitating anxiety among girls is also theoretically meaningful. Moderate levels of anxiety may increase attentional focus, motivation, and preparation for academic tasks when students possess sufficient emotional regulation abilities. Adolescents with higher psychological flexibility may experience anxiety in a more adaptive form because they can tolerate emotional discomfort while maintaining goal-directed academic behavior. This interpretation aligns with contemporary perspectives distinguishing between debilitating and facilitating forms of academic anxiety. Habib Zadeh et al. reported that different motivational profiles are associated with different forms of examination anxiety among students (Habib Zadeh et al., 2024). Likewise, Khaleghi et al. found that self-efficacy mediates the effects of thinking and learning styles on examination anxiety, indicating that adaptive psychological characteristics may transform anxiety into a motivational rather than disruptive experience (Khaleghi et al., 2023). The present findings therefore suggest that psychological flexibility may help adolescents channel academic stress into productive engagement rather than maladaptive emotional distress.

The present study also demonstrated important gender differences in the relationships among self-efficacy, psychological flexibility, and academic anxiety. Specifically, self-efficacy negatively predicted debilitating anxiety among girls, whereas among boys it positively predicted facilitating anxiety. In addition, the mediating role of psychological flexibility was significant only among girls. These findings may reflect gender differences in emotional processing, coping strategies, and academic socialization during adolescence. Female students often report higher levels of emotional sensitivity and internalizing symptoms, making psychological regulation processes particularly important for managing academic stress. In contrast, male students may interpret anxiety differently and may experience moderate anxiety as motivational activation rather than emotional distress. Previous research supports these interpretations. Sanchis-Sanchis et al. found significant gender differences in emotion regulation among adolescents, indicating that boys and girls use different emotional coping strategies (Sanchis-Sanchis et al., 2020). Naseri et al. also demonstrated that the pathways linking self-efficacy, emotion regulation, and entrance examination anxiety differ across genders (Naseri et al., 2025). Similarly, Li et al. reported significant gender-based differences in multigroup structural models examining resilience and adaptive outcomes among adolescents (Li et al., 2025). Syamsuyurnita et al. likewise emphasized that psychological pathways related to anxiety reduction may differ across groups in multigroup analyses (Syamsuyurnita et al., 2023). These findings collectively indicate that gender plays a critical role in shaping adolescents' emotional experiences and psychological adjustment within educational settings.

The significant indirect effects observed among girls further highlight the importance of psychological flexibility

as a mediating mechanism between self-efficacy and academic anxiety. Female students with stronger efficacy beliefs may be more capable of tolerating distress, accepting emotional experiences, and adapting flexibly to academic pressures, which subsequently reduces debilitating anxiety and promotes facilitating anxiety. This interpretation is consistent with broader theoretical frameworks emphasizing the interconnected roles of self-efficacy, resilience, and adaptive regulation processes. Xia et al. demonstrated that resilience mediates the relationship between contextual experiences and psychological security among adolescents (Xia et al., 2024). Similarly, Peng et al. showed that resilience functions as an important psychological pathway linking behavioral and emotional adaptation among adolescents (Peng et al., 2025). Cheng et al. further emphasized that self-efficacy, self-regulation, and anxiety dynamically interact during academic development (Cheng et al., 2026). Together, these findings suggest that efficacy beliefs may influence adolescents' academic emotions partly through adaptive psychological regulation processes such as flexibility and resilience.

The present findings also highlight the importance of emotional regulation processes in academic anxiety. Previous studies have consistently shown that maladaptive emotion regulation strategies intensify anxiety symptoms among students. Hasani demonstrated that ineffective cognitive emotion regulation strategies are strongly associated with increased test anxiety (Hasani, 2014). Similarly, Sharma and Kumra found that self-efficacy mediates the relationship between mindfulness and emotional distress, indicating that adaptive self-regulatory processes reduce anxiety symptoms (Sharma & Kumra, 2022). Intervention-based studies further support the importance of emotional regulation mechanisms. Mousavi et al. reported that emotional schema therapy improved self-regulation and reduced examination anxiety among female students (Mousavi et al., 2024). Salari Poor et al. also found that interventions targeting cognitive-emotional functioning improve both working memory and anxiety outcomes among students (Salari Poor et al., 2024). Rostami et al. likewise demonstrated that interventions focused on strengthening coping abilities and self-confidence significantly reduce social and examination anxiety (Rostami et al., 2024). These findings support the present study by emphasizing that adaptive emotional and cognitive regulation processes are essential for reducing academic anxiety among adolescents.

Another important implication of the present findings relates to the broader educational and interpersonal context of adolescent development. Academic anxiety does not emerge solely from individual cognitive characteristics but is shaped by interactions between students and their social environments. Cui et al. demonstrated that teacher and peer support influence emotions and academic engagement through motivational pathways (Cui et al., 2026). Chen et al. likewise emphasized the role of parenting behaviors and educational support in promoting adolescents' self-efficacy (Chen et al., 2023). Harma et al. also showed that supportive parental control contributes positively to academic self-regulation and adjustment (Harma et al., 2025). These findings indicate that interventions designed to reduce academic anxiety should not focus exclusively on students' individual characteristics but should also consider educational climates, interpersonal support systems, and family-related influences.

Although the present study provides important contributions to understanding academic anxiety among adolescents, some findings require careful interpretation. Psychological flexibility did not significantly predict academic anxiety among boys, suggesting that alternative variables may be more influential in explaining anxiety within male students. It is possible that boys rely more heavily on external coping mechanisms, peer-related factors, or motivational processes not examined in the present study. Previous research suggests that contextual and social variables may operate differently across genders during adolescence (Cui et al., 2026; Li et al., 2025). Therefore, additional research is needed to identify the specific psychological and contextual factors that influence academic anxiety among male students.

Overall, the findings of the present study emphasize the important role of self-efficacy and psychological flexibility in explaining adolescents' academic anxiety and demonstrate that these relationships vary across gender groups. The study contributes to the literature by providing a multigroup structural perspective on the psychological mechanisms underlying academic anxiety during adolescence. The findings suggest that strengthening self-efficacy and promoting psychological flexibility may help adolescents manage academic stress more effectively and reduce maladaptive anxiety experiences. Furthermore, considering gender differences in educational and psychological interventions may improve adolescents' emotional adjustment, academic engagement, and psychological well-being.

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The present study has several limitations that should be acknowledged. First, the cross-sectional nature of the study limits the ability to establish causal relationships among self-efficacy, psychological flexibility, and academic anxiety. Second, the sample was limited to adolescent students from Tehran, which may restrict the generalizability of the findings to other cultural or educational contexts. Third, all variables were assessed using self-report questionnaires, which may be influenced by social desirability bias or response distortion. In addition, the study focused on a limited number of psychological variables and did not examine potentially important factors such as family functioning, peer relationships, socioeconomic status, academic achievement, or personality characteristics.

Future research should employ longitudinal and experimental designs to better clarify the causal pathways linking self-efficacy, psychological flexibility, and academic anxiety among adolescents. Researchers are also encouraged to investigate additional mediating and moderating variables such as resilience, mindfulness, coping styles, family support, and school climate. Studies with larger and more diverse samples from different educational regions and cultural backgrounds would strengthen the generalizability of findings. Moreover, future studies should further explore why the mediating role of psychological flexibility appears stronger among girls and identify the psychological mechanisms that are more relevant for boys' academic emotional functioning.

From a practical perspective, the findings suggest that educational counselors, school psychologists, and teachers should prioritize interventions designed to strengthen adolescents' self-efficacy and psychological flexibility. School-based programs focusing on emotional regulation, acceptance-based coping strategies, resilience training, and adaptive self-regulation skills may help students manage academic stress more effectively. Educational systems should also consider gender differences when designing psychological interventions, as girls and boys may respond differently to emotional and motivational challenges. Creating supportive educational environments that encourage confidence, emotional expression, adaptive coping, and positive interpersonal relationships may contribute significantly to reducing debilitating academic anxiety and promoting healthier academic adjustment among adolescent students.

Authors' Contributions

Authors equally contributed to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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