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Academic Motivation, Fear of Negative Evaluation, Self-Efficacy, and Self-Regulated Learning: Role of Affective Mechanisms in the Learning Process

Emre Toprak[1] and Emine Yavuz[1*]

Abstract

Background Although prior research has explored the impact of fear of negative evaluation on students' academic motivation, limited attention has been given to identifying potential intermediary mechanisms explaining this relationship. This study aims to uncover how academic self-efficacy and self-regulated learning skills work in sequence as mediating variables between adolescents' fear of being negatively evaluated and their educational drive.

Methods This correlational study included a sample of 1,000 adolescents (58.8% female) aged 14–15 years and was conducted via self-report screening tools. After the data cleaning process, preliminary analyses and descriptive statistics were conducted. To test Hypothesis 1, the Pearson product–moment correlation was calculated, and to test Hypothesis 2, structural equation modeling was chosen to test the theoretical model examined in the study.

Results Higher levels of fear of negative evaluation were correlated with lower academic motivation (r=-.51). This relationship was partly explained by the influence of self-efficacy and self-regulated learning, which sequentially mediated the link between fear of negative evaluation and academic motivation. Perceived academic self-efficacy has a stronger mediating effect.

Conclusions As a result, the significant effect of fear of negative evaluation on academic motivation remained significant even though it decreased when the mediating variables were included in the model. These findings suggest that fear of negative evaluation may play an important role in academic motivation, although further research is needed to clarify the causal mechanisms involved. It is recommended that program studies be carried out to reduce the fear of negative evaluation, that designed teaching environments be created, and that measurement and evaluation methods be used to minimize this anxiety.

Keywords Academic motivation, Fear of negative evaluation, Self-efficacy, Self-regulated learning, Sequential mediation

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Introduction

Academic success has a multidimensional structure encompassing many components. The cognitive and affective characteristics that individuals must develop and cope with are factors that shape academic success. Adolescents, in particular, struggle to cope with numerous situations that cause fear and anxiety caused by cognitive load. This situation necessitates simultaneously developing cognitive strength while coping.

Quality learning continues with an individual's genuine involvement and motivation in learning processes. In his social cognitive theory, Bandura [1] argues that personal and environmental factors influence an individual's behavior, which is reflected in their learning processes.

Similarly, Zimmerman [2], in his self-regulated learning model, de la Fuente et al. [3], in their self-versus-externally regulated behavior theory, and de la Fuente and Martínez-Vicente [4], in their conceptual utility model of stress management and academic well-being, explained self-efficacy and self-regulation as factors influencing academic motivation, focusing on the impact of evaluation anxiety on academic motivation.

Conceptual framework

While the current research is primarily based on Bandura's [1] social cognitive theory, it is also linked to three different theoretical frameworks. According to Bandura [1], the individual is the active agent of the learning process. During this process, individuals possess affective constructs, such as interest, fear, anxiety, and motivation, as well as skills such as self-efficacy and self-regulation. At this point, relationships can be established between academic motivation, self-regulation, and fear of negative evaluation. This relationship may be based on another theory, Zimmerman's self-regulated learning model [2], which posits that academic self-efficacy is a precursor to self-regulation. Students are expected to have a high sense of self-efficacy to achieve quality learning from the outset. Furthermore, Fuente et al.'s [3] self-versus externally regulated behavior theory conceptualizes the impact of self-regulation skills on learning motivation. Indeed, the final theory on which the study is based, de la Fuente & Martínez-Vicente's [4] conceptual utility model for stress management and academic well-being, focuses on the impact of cognitive and affective characteristics on academic performance. Considering the influence of fear of negative evaluation, self-efficacy beliefs, and self-regulation factors on academic motivation, the overall framework outlined here strengthens and supports the sequential mediation model structure in our study (self-efficacy → self-regulation → academic motivation).

FNE is an individual's fear of being criticized, humiliated, or perceived as inadequate by others [5]. The FNE experienced by individuals in academic settings negatively impacts their engagement and motivation [6]. According to Bandura, FNE weakens individuals' self-efficacy beliefs and reduces AM [7, 8]. Furthermore, research shows that the anxiety caused by FNE reduces the capacity to use self-regulated learning skills [1, 9]. Self-efficacy, on the other hand, is an individual's personal belief in their ability to initiate, sustain, and complete a specific task [8]. As stated in the theories on which the research is based, the perception of self-efficacy acts as a driving force that strengthens learning motivation by triggering self-regulation. Individuals with a high perception of self-efficacy can plan their learning processes, conduct self-assessments, and demonstrate improvement by activating self-regulation skills [2].

Present study

Assessing the impact of FNE on AM via self-efficacy perception and self-regulatory learning skills is crucial for formulating preventive strategies to mitigate this anxiety. The increase in digital/social media use in recent years has led young people to feel constantly evaluated, suggesting that FNE is a current problem that threatens individual and academic functioning (e.g. [10–12]), . This increases the importance of this study in contemporary educational settings. Despite increased interest in the psychological aspects that influence students' academic results, research into the relationship between FNE and AM is limited. This gap highlights the relevance of the present study. This study is positioned as a molecular-level investigation, examining micro-level cognitive mechanisms of learning, such as self-efficacy and self-regulation. Based on previous evidence, it is anticipated that students who experience higher levels of FNE tend to exhibit lower levels of AM and performance. Self-efficacy is a key antecedent cognitive mechanism that determines students' capacity to initiate and maintain self-regulatory strategies [13]. It is sociocognitively expected that students with low self-efficacy will reduce strategy use by increasing their perception of threat to performance. In contrast, students with high self-efficacy will prioritize self-regulation. Students' self-efficacy beliefs influence the selection and maintenance of strategies. Students with low self-efficacy fail to activate self-regulatory strategies [14]. Low academic self-efficacy reduces strategic learning behaviors such as planning and monitoring and hinders cognitive engagement [15].

While prior studies have confirmed direct associations between FNE, self-efficacy beliefs, and self-regulated learning, the potential mediating roles of these factors have yet to be empirically tested. The secondary objective of this research is to investigate whether academic self-efficacy and self-regulated learning serve as sequential mediators in the link between FNE and AM. Grounded

mainly in SCT and recent empirical findings, the study proposes the following hypotheses:

1. A statistically significant relationship will exist between FNE, academic self-efficacy, self-regulated learning skills, and AM.
2. A statistically significant mediating role of academic self-efficacy and self-regulated learning skills exists in the relationship between FNE and AM.

Method

Participants

The population, which was subjected to correlational research [16], consists of approximately one million eighth-grade adolescents continuing their education in Turkey from 2024 to 2025. To avoid any confounding effects that might arise from differences in socioeconomic status and the language barrier, this study focused on schools with similar socioeconomic statuses and adolescents whose native language was Turkish. Therefore, via the convenience sampling method, 1000 volunteer adolescents whose native language was Turkish and were studying in schools with similar socioeconomic statuses were included in the study. Convenience sampling is a nonprobability sampling method where the researcher selects participants who are most accessible and readily available at the time of the study. A total of 58.8% of the adolescents were female (588), and 41.2% were male (412).

Measures

Fear of being negatively evaluated in academic settings

The scale developed by Leary [5] and adapted to Turkish culture by Çetin et al. [17] consists of 11 items on a 5-point Likert-type scale. A high score on the scale indicates that the student in Türkiye has a high FNE. The Cronbach's alpha coefficient for the overall one-dimensional self-report scale was 0.84 [5], whereas it was 0.92 for the overall scale in the present study. As a result of the confirmatory factor analysis (CFA), the model-data fit index values are as follows: χ2/sd: 3.199, Root Mean Square Error Approximation (RMSEA): 0.066[0.054-0.079], Comparative Fit Index (CFI):0.968, Goodness-of-fit index (GFI): 0.948. Considering the index values, the model-data fit is acceptable [18–20].

Academic motivation scale

Bozanoğlu [21] developed a scale for a Turkish sample consisting of 20 items on a 5-point Likert-type scale. A high score on the scale indicates that the student has high motivation. The self-report scale consists of three dimensions, with a Cronbach's alpha coefficient of 0.84 for the overall scale [21], whereas the coefficient was 0.93 for the overall scale in the present study. As a result of the CFA examining the suitability of the study sample for the determined factor structure of the scale, the model data fit index values are as follows: χ2/sd: 3.194, RMSEA: 0.066[0.060-0.073], CFI:0.933, GFI: 0.902, and normed fit index (NFI): 0.906. Considering the index values, the model-data fit is excellent [18–20].

Academic self-efficacy scale

The scale developed in the Turkish sample by Yılmaz, Gürçay, and Ekici [22] consists of 7 items on a 5-point Likert-type scale. A high score on the scale indicates that the student has high academic self-efficacy. The Cronbach's alpha coefficient for the overall self-reported, unidimensional scale was 0.79 [22], whereas it was 0.87 for the overall scale in the present study. As a result of the CFA, the model-data fit index values are as follows: χ2/sd: 4.154, RMSEA: 0.080 [0.059-0.101], CFI: 0.968, GFI: 0.967, NFI: Considering the index values, the model-data fit is excellent [18–20].

Perceived self-regulation scale

Arslan and Gelişli [23] developed a 5-point Likert-type scale consisting of 16 items in a Turkish sample. A high score on the scale indicates that the student has high self-regulation skills. The self-report scale has three dimensions, with a Cronbach's alpha coefficient of 0.90 for the overall scale [23], whereas the coefficient for the overall scale was 0.93 in the present study. As a result of the CFA, the model-data fit index values are as follows: χ2/sd: 5.016, RMSEA: 0.090[0.082-0.097], CFI: 0.907, GFI: 0.860, NFI: 0.887. Considering the index values, the model-data fit is acceptable [18–20].

Procedure

Prior to data collection, ethical approval was obtained from the University Social and Human Sciences Ethics Committee, application number 535. Informed consent was obtained from all study participants, and for participants under the age of 16, consent was obtained from their legal guardians. The study was conducted in accordance with the principles outlined in the Declaration of Helsinki. After receiving permission from school administrations, data were collected during regular school hours through face-to-face administration. Participants were informed about the purpose of the study, the voluntary nature of participation, confidentiality of responses, and their right to withdraw at any time without penalty. The instruments were administered collectively in classroom settings under the supervision of the researchers. Completion of the questionnaire took approximately 20–25 min. No identifying information was collected to ensure anonymity. After data collection, responses were coded and transferred into Microsoft Excel 2019 for

organization before being analyzed using SPSS 26.0 [24] and AMOS 24.0 [25].

Analytic approach

In this study, descriptive statistics were analyzed to obtain diagnostic information about the variables, and then, Pearson product-moment correlation was calculated to determine the relationships between variables (Hypothesis 1). The correlation coefficient obtained was evaluated between the criteria of a 0.70 – 1.00 range high, a 0.70-0.30 range medium, and a 0.30-0.00 range low in absolute value [26]. The structural equation modeling (SEM) method was used to test the theoretical model, and Hypothesis 2 was examined in this study. The model was tested in four steps according to Kline [27]: 1. Model specification, 2. Model identification, 3. Parameter estimation, 4. Model testing and evaluation. To assess model-data fit, the χ^2/df, RMSEA, NFI, and CFI criteria were considered.

Before starting the analyses, organizing the data, checking some assumptions, and determining whether the prerequisites are met are necessary. In this study, there were no missing values, and outliers were examined via z values and the Mahalanobis distance of the variables. Considering four variables, the χ^2 critical value for the Mahalanobis distance at df = 4 and a stringent significance level of 0.001 is 18.467, and observations exhibiting values exceeding this threshold were consequently classified as multivariate outliers. As a result of the outlier analysis, the data of 17 people were removed from the dataset. To calculate the Pearson correlation coefficient, researchers must check that the variables are continuous, normal, linear, and homogeneous [28].

The current study examined the normality assumption from the skewness, kurtosis values, and histogram shapes, and according to the results, the variables have a normal distribution. Homoscedasticity was assumed by considering the scatter plot. This study examined multicollinearity with tolerance and variance inflation factor (VIF) values. The tolerance values ranged between 0.46 and 0.69, whereas the VIF values ranged between 1.45 and 2.16. The tolerance values exceeded 0.10, and the VIF values were less than 10, indicating that there was no significant multicollinearity problem in this study.

The sample size for SEM should be at least 200 [27]. This criterion was checked since the sample size in the current study was 1000. The bootstrap method was used in SEM mediation analysis [29]. It is a nonparametric resampling technique used to empirically estimate the sampling distribution of parameter estimates, enabling the calculation of robust standard errors and more accurate confidence intervals without relying on traditional assumptions of normality. In the model, the tests were performed through 10,000 samples with a 95% confidence interval. Confidence intervals (CIs) were used to measure the significance of the effects in the model. The absence of 0 s between the confidence intervals is interpreted as the variable effects being statistically significant [29].

Results

Preliminary results

We examined the Mean, SD, Min., Max., Skewness (Std. Error), and Kurtosis (Std. Error) values to obtain descriptive results. Additionally, we performed a normality test to examine the distribution of the data. Adolescents' mean FNE, PASE, PSR, and AM scores are close to the midpoints of the related scales (Table 1). Because the sample size was greater than 50, the Shapiro–Wilk normality test was performed, and it was determined that all the variables were not normally distributed ($p < .05$). This is expected in studies with large samples, as hypothesis tests tend to be significant in large samples.

Table 1 Descriptive statistics

Variables	Mean	SD	Min.	Max.	Skewness (Std. Error)	Kurtosis (Std.Error)
(1) Academic motivation[a] (AM)	68.986	16.234	33.00	94.00	−0.378 (0.15)	-1.379 (0.46)
(2) Fear of negative evaluation[b] (FNE)	28.466	8.386	11.00	55.00	0.329 (0.11)	1.395 (0.47)
(3) Perceived academic self-efficacy[c] (PASE)	24.179	7.021	7.00	34.00	−0.910 (0.33)	0.425 (0.19)
(4) Perceived self-regulation[d] (PSR)	44.645	8.673	16.00	80.00	−0.149 (0.50)	1.192 (0.40)

N = 1000

[a]The score ranges from 20–100

[b]The score ranges from 11–55

[c]The score ranges: from 7 to 35

[d]The score ranges from 16 to 80

Table 2 Relationships for variables

Variables	(AM)	(FNE)	(PASE)	(PSR)
(1) Academic motivation[a] (AM)	1			
(2) Fear of negative evaluation[b] (FNE)	−0.51*	1		
(3) Perceived academic self-efficacy[c] (PASE)	0.64*	−0.55*	1	
(4) Perceived self-regulation[d] (PSR)	0.52*	−0.44*	0.68*	1

*p<.01; N = 1000

[a]The score ranges from 20-100

[b]The score ranges from 11-55

[c]The score ranges from 7-35

[d]The score ranges from 16-80

Association results

Negative and moderate relationships were detected between FNE and the PASE, PSR, and AM, and moderate and positive relationships were detected between the PASE, PSR, and AM (Table 2).

Mediational results

In this study, the partial mediation model, supported by the literature, is fully specified (saturated) because it has $df_{partial}$=0, and it is not possible to examine the model-data fit of this model. Therefore, to increase the validity and reliability of our partial mediation model's testing via structural equation modeling, we first tested the full mediation model by removing the direct path from FNE ◊ AM. The model data fit index values are as follows: $\chi^2_{full} = 52.636$, df_{full} =1, χ2/sd: 52.636, RMSEA: 0.227[0.177 0.282], CFI:0.967, GFI: 0.975, and normed fit index (NFI): 0.967. The fit indexes for this model were found to be inadequate due to the high RMSEA value of 0.227 and a χ2 ratio of 52.636, despite the high CFI/GFI/NFI values. Our partial mediator model has df_{partial}=0 and $\chi^2_{partial} = 0$.

The change in chi-square ($\Delta\chi^2$) is calculated as follows:

$$\triangle x^2 = x^2_{full} - x^2_{partial} = 52.636 - 0 = 52.636$$

Calculation for the change in degrees of freedom (Δdf):

$$\triangle \text{df} = df_{\text{full}} - df_{\text{partial}} = 1 - 0 = 1$$

The chi-square difference test comparing the full mediation model to the partial mediation model yielded $\Delta\chi^2(1) = 52.636$. This value is statistically significant (p < .001), indicating that the partial mediation model provides a significantly better fit to the data than the more parsimonious full mediation model does.

As a result, the direct effect of FNE on AM in the model without mediating variables (β = −0.98, SE = 0.05, C.R. = -18.51, p < .01) was statistically significant. The theory-based model used in this study is shown in Fig. 1. Since the model's degree of freedom (df; degree of freedom) is equal to 0, it is fully specified (saturated model). Although the fully specified model can be estimated via SEM, the fit values of the model are not examined since df = 0. Figure 1 shows that the direct effects of FNE (β = −0.40, SE = 0.06, C.R. = -7.35, p < .01), PASE (β = 1.01, SE = 0.08, C.R. = 12.65, p < .01) and PSR (β = 0.25, SE = 0.06, C.R. = 4.12, p < .01) on AM were significant after the model was established. Furthermore, the direct effects of FNE on PASE (β= −0.46, SE = 0.02, C.R.= -20.82, p< .01) and PSR (β= −0.10, SE = 0.03, C.R.= -3.52, p < .01) are significant. Finally, the direct effect of the first mediator variable (PASE) on the second mediator variable (PSR) was also significant (β = 0.77, SE = 0.03, C.R. = 22.53, p < .01).

When the PASE and PSR mediators were included in the model, the direct effect of FNE on AM decreased but was still significant (β = −0.40, SE = 0.06, C.R. = -7.35, p< .01). The fact that the direct effect of FNE on AM decreased and remained significant indicates that the PASE and PSR variables have a partial mediating effect

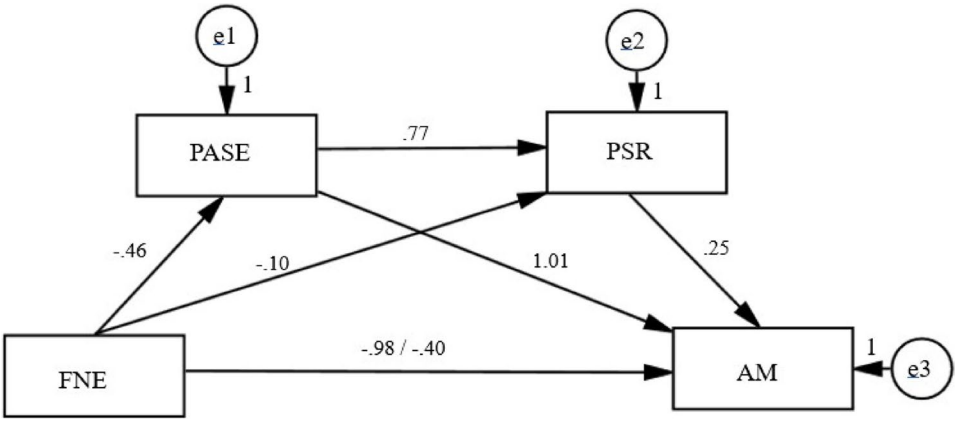


Fig. 1 Series of multiple mediation effects with unstandardized β values of the variables

Table 3 Indirect effects of FNE on AM based on path analysis

Indirect Effects	Estimate	Lower CI	Upper CI
FNE → PASE → AM	−0.46**	−0.38	−0.55
FNE → PSR → AM	−0.03*	−0.01	−0.06
FNE → PASE → PSR → AM	−0.09**	−0.05	−0.12
Total Indirect Effects	−0.58**	−0.51	−0.64

*$p<.05$; **$p<.01$

on the relationship between FNE and AM. Table 3 shows the indirect effects of FNE on AM.

Table 3 shows that the indirect effect of FNE on AM via PASE (point estimate = – 0.46 [-0.38, – 0.55]), the indirect effect of FNE on AM via PSR (point estimate = – 0.03 [-0.01,– 0.06]), and the indirect effect of FNE on AM via PASE and PSR sequentially (point estimate = – 0.09 [-0.05, – 0.12]) are statistically significant. Finally, the overall indirect effect of FNE on AM through PASE and PSR, as examined via the bootstrap method, is statistically significant (point estimate = – 0.58 [-0.51, – 0.64]). In addition, according to Table 3, PASE has a stronger mediating effect.

Discussion and conclusion

This study is a molecular-level investigation examining microlevel cognitive mechanisms of learning, such as self-efficacy and self-regulation. This study supported the two proposed hypotheses by examining the relationships between FNE and AM, PASE, and the PSR. The negative relationship between FNE and AM is the first result of this study. Furthermore, the PASE score and PSR were found to have a partial mediating effect on this relationship.

The negative relationships between FNE and AM, PASE, and PSR suggest that higher fear of negative evaluation is associated with lower academic motivation and weaker self-beliefs. These results can be explained within the framework of Bandura's [1] social cognitive theory. Accordingly, the individual, the environment, and behavior are parts of a system composed of interrelated concepts. In the learning process, belief, fear, and motivation are important components that influence and predict one another. We suggest that the fear of negative evaluation may directly impact academic motivation and that self-efficacy and self-regulation factors may shape this relationship. There are also studies in the literature suggesting that FNE can reduce interest in learning and academic achievement [30, 31]. Furthermore, it has been suggested that FNE negatively impacts academic functioning [5, 6].

The research results are also supported by Zimmerman's [7] self-regulated learning model, de la Fuente et al.'s [3] self-versus externally regulated behavior theory, and the conceptual utility model for stress management and academic well-being. The results indicate a significant relationship between FNE and AM, suggesting that students who experience higher evaluative anxiety may report lower levels of academic motivation. When academic self-efficacy and self-regulated learning variables were included in the model, this direct effect decreased but remained statistically significant. This finding suggests that both academic self-belief and self-regulated learning skills jointly mediate the pathway from evaluative anxiety to motivation, although it is a partially sequential-mediating accounting for the relationship.

Self-efficacy is a driving motivational force for learning, as evidenced by the increased participation and higher expectations of success among students with high self-confidence. The research model found that the mediating effect of self-efficacy was more significant than that of self-regulation. This result supports Bandura's assessment of self-efficacy as a precursor to individual action. Additionally, this result can be explained by the self-regulated behavior theory of de la Fuente et al. [3]. In de la Fuente et al.'s [3] theory of self-regulated behavior, individuals' behavior is classified according to their level of behavioral regulation. The first is the high level, where individuals self-regulate their behavioral processes (planning, monitoring, and evaluation), resulting in high academic motivation and strong learning outcomes. This level is referred to as "self-regulated behavior." The second is the intermediate level, where individuals self-regulate their behavior to some extent but require external guidance. This level is referred to as "co-regulated." The third and final level is the low level, where individuals cannot develop their own planning and strategies and are more likely to be influenced by negative external emotions. This level is referred to as "externally regulated behavior." This classification is a design that reveals the influence of external factors on individuals' behavior management. This perspective highlights the significant impact of self-efficacy on self-regulation.

Additionally, Zimmerman and Schunk [13] describe self-efficacy as a crucial cognitive mechanism that determines students' ability to initiate and maintain self-regulatory strategies. Furthermore, it has been reported that students with high self-efficacy prioritize self-regulation, enabling them to select and sustain effective learning strategies [14]. In contrast, students with low self-efficacy tend to fail to activate self-regulatory strategies [15].

The conceptual utility model explains students' capacity to cope with academic stress through the interaction between environmental factors, personal resources, self-regulatory processes, and outcome variables. In the current study, fear of negative evaluation is included in the model as an environmental factor. Self-efficacy serves as a personal psychological resource, while self-regulation governs behavior. Academic motivation, on the other hand, is a key factor in academic functioning. Here, it can

be argued that personal regulatory resources transform stress sources. Fear of negative evaluation negatively impacts self-efficacy perception. The second link in the negative chain is a decline in self-efficacy, which weakens self-regulatory skills. Adhering to the conceptual utility model, we can argue that self-efficacy and self-regulation serve as powerful supports to academic motivation.

In educational processes based on constant testing, students may internalize the thought of "I cannot succeed." This cognitive belief can inhibit students' motivation to use learning strategies. Therefore, the indirect effect of self-efficacy on motivation is more dominant than that of self-regulation. High-stress exams, such as the LGS-YKS, which students in Turkey are required to take to enter qualified schools, cause students to experience constant evaluation anxiety. This negatively impacts their self-efficacy perceptions and can prevent them from using self-regulatory strategies. When teenagers lack confidence in their academic skills, they are less likely to employ self-regulatory strategies such as planning, tracking their progress, or adjusting their learning approach. In other words, weakened self-efficacy may suppress the initiation of strategic learning behaviors, making self-efficacy a more proximal determinant of motivation than self-regulation. This interpretation aligns with Bandura's assertion that efficacy beliefs provide the motivational foundation for engaging in self-regulated learning and Zimmerman's [13] conceptualization of self-efficacy as a cyclical process involving foresight, performance, and self-reflection.

Implications and future research

In this study, the relationship between FNE and AM remained significant even after the inclusion of mediating variables. This result can be interpreted as FNE, a strong predictor in studies of AM. In addition, it is recommended that program studies be carried out to reduce the FNE, that designed teaching environments be created, and that measurement and evaluation methods be used to minimize this anxiety.

Self-efficacy is an individual's belief that he/she can exhibit the required behaviors in a particular field [8]. Academic self-efficacy is an individual's belief in their ability to do academic assignments successfully. According to our model, academic self-efficacy partially mediates between FNE and AM. Rather than targeting evaluative fear directly, interventions that enhance students' confidence in their academic abilities and foster self-guided learning may lead to more sustainable increases in motivation.

According to Bandura [8], individuals' self-efficacy beliefs can develop or weaken over time due to experiences, feedback, and environmental factors. At this point, the current study suggests that academic self-efficacy can be improved by providing opportunities for individuals to demonstrate their success in academic environments, being in environments where they can observe the success of people similar to them, and being provided with social support, thus strengthening their positive mood. Consequently, academic self-efficacy has a beneficial impact that might be exerted on AM.

Similarly, self-regulated learning skills are skills that can be developed. It is stated that a self-regulated learning skill is an individual's ability to design, monitor, evaluate, and reorganize his/her learning process when necessary [7]. The current study suggests that developing self-regulated learning skills through self-regulatory strategies can be achieved by providing individuals with education, transparent learning environments that facilitate self-evaluation, and qualified models and guidance. Again, this may contribute positively to individuals' AM. Researchers can reveal relationships more clearly by testing this model with an experimental design. The mediating effects of various psychological variables can be investigated in the current model, or the mediating effects of the existing variables can be investigated by incorporating academic success into the current model.

Teachers should focus on process-oriented assessments when determining student achievement, emphasizing effort and progress over performance comparisons. They should set structured tasks to reduce the pressure of evaluation and eliminate the fear of embarrassment. They should instill strategic learning skills in students by teaching them planning, monitoring, and revision strategies. Similarly, school counselors should plan sessions to reduce students' perceptions of evaluation and social comparison through cognitive restructuring programs. Students should be allowed to observe their peers' success, and panels should be organized to discuss the steps on the path to success.

In the Turkish context, the most fundamental problem is the use of a centralized exam system to gain admission to qualified schools. It is clear that students are psychologically exhausted during these processes. It is an undeniable fact that these practices trigger factors such as stress, anxiety, and depression. Therefore, summative evaluations must be supported by process evaluations.

In the Turkish education system, students' family income level is a variable that directly affects their fear of negative evaluation, academic motivation, self-efficacy, and self-regulation. Therefore, administrators, teachers, and psychological counselors must consider differences related to this variable in their planning and implementation. Furthermore, socioeconomic factors should be a variable that should be included in new research designs.

Several constraints should be noted regarding this investigation. First, the research sample consisted exclusively of eighth-grade students from central Turkey, so

the findings cannot be generalized to other demographic groups. Second, the study's reliance on self-reported questionnaire data raises concerns about response bias and potential unmeasured social desirability effects. Third, although the theoretical model accounts for key variables, the potential influence of unexamined confounding factors cannot be ruled out due to the limited empirical data available. Fourth, the study employs a cross-sectional design, examining data over a specific period. This limit is the ability to conclude causal relationships between variables. Longitudinal studies are necessary to understand how these relationships develop over time [32]. Fifth, future research could investigate how cultural and contextual factors affect the relationship between FNE and AM.

Another limitation relates to the use of self-report instruments, which may introduce common method bias and social desirability effects. Furthermore, the correlational and cross-sectional nature of the study restricts the ability to draw causal inferences among the variables. Future studies using longitudinal or experimental designs may provide stronger evidence regarding the directional relationships among fear of negative evaluation, self-efficacy, self-regulated learning, and academic motivation.

Another limitation relates to the use of self-report instruments, which may introduce common method bias and social desirability effects. Furthermore, the correlational and cross-sectional nature of the study restricts the ability to draw causal inferences among the variables. Future studies using longitudinal or experimental designs may provide stronger evidence regarding the directional relationships among fear of negative evaluation, self-efficacy, self-regulated learning, and academic motivation.

Abbreviations

AM	Academic motivation
CFA	Confirmatory factor analysis
CFI	Comparative Fit Index
FNE	Fear of negative evaluation
NFI	Normed Fit Index
RMSEA	Root mean square error approximation
SCT	Social Cognitive Theory
SEM	Structural equation modeling
VIF	Variance Inflation Factor

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'Not applicable' for that section.

Authors' contributions
Toprak and Yavuz devised the study design; extracted, screened, and analyzed the data to finalize the article for review; and wrote the manuscript. All the authors read and approved the final manuscript.

Funding
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Data availability
The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
We obtained ethical approval for this study from the Erciyes University Social and Human Sciences Ethics Committee under application number 535. The study was conducted in accordance with the principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants, and for those under the age of 16, consent was additionally obtained from their parents or legal guardians. The proofreading of this study was made using AJE, a Language quality checker using AI recommended by the journal.

Consent for publication
'Not applicable' for that section.

Competing interests
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