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## THE RELATIONSHIPS BETWEEN SELF-REGULATION, CRITICAL THINKING DISPOSITIONS, AND ACADEMIC MOTIVATION AMONG SECONDARY SCHOOL STUDENTS: A STRUCTURAL EQUATION MODELING

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### ABSTRACT

This study aimed to examine the impact of secondary school students' self-regulation and critical thinking dispositions on their academic motivation using structural equation modeling. A total of 380 secondary school students from Elazığ participated in the study. Data collection included scales measuring perceived self-regulation, critical thinking disposition, and academic motivation. A relational design was employed to explore the mediating role of critical thinking in the relationship between self-regulation and academic motivation. Structural regression modeling was used to analyze the relationships between self-regulation, critical thinking, and academic motivation, as well as to examine the direct and indirect effects of the variables on each other. SPSS and AMOS were used for data analysis. Skewness and kurtosis were assessed to confirm the normality of the data. Cronbach's alpha analysis was performed to test the reliability of the scales and it was concluded that the scales were reliable. At the same time, KMO and Bartlett's tests were performed to test the validity of the scales and it was concluded that the scales were valid. The results indicated that self-regulation had a significant positive effect on academic motivation. When critical thinking was included as a mediating variable, the strength of the positive relationship increased. This finding suggests that critical thinking partially mediates the relationship between self-regulation and academic motivation. In line with the results of the research, activities can be designed for classroom guidance programs that will increase students' self-regulation, critical thinking and academic motivation. Current educational programs may include activities aimed at increasing students' motivation, critical thinking, and self-regulation, which may therefore increase their desire to learn.

**Keywords:** Self-regulation, critical thinking, academic motivation.

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## INTRODUCTION

With the changing needs, learning situations of individuals are changing. Learning situations differ from one person to another, and individuals exploit different learning styles to achieve their learning goals. The learning experiences and perspectives individuals possess affect their learning situations. The thoughts individuals have about learning activities, their ability to select information, and their desire to learn can either facilitate or hinder their learning.

Motivation is necessary to increase individuals' interest in transforming the information they have learned into behavior (Schunk, Pintrich, & Meece, 2008). It is the willingness to reach specific goals and to interpret things from different perspectives. It consists of the energy that individuals are willing to expend toward a goal (Dörnyei & Otto, 1998; Gardner, 1985). At the top of Maslow's hierarchy of needs is self-actualization. The hierarchy, starting from the bottom, includes physiological needs, safety needs, the need for belonging, esteem, and finally, self-actualization. As these needs are fulfilled, individuals are expected to become increasingly motivated (Maslow, 1943). In educational settings, some learning experiences occur easily, while others can be challenging. On occasion, individuals may show reluctance to learn. When considering the factors influencing students' learning today, there is a strong emphasis on individual differences. Students' learning is often approached through metacognitive concepts (Aydın & Demir, 2014, p. 2).

In academic life, motivation is the driving force that increases desire to learn. Through motivation, students can more easily and comfortably complete the tasks assigned to them (Lintern, 2002). Individuals with high motivation in learning processes are in an advantageous position (Lintern, 2022).

A student with low motivation may struggle with learning. Therefore, ensuring a high level of motivation during educational processes will enhance individuals' learning (Karataş, 2011). Academic motivation is the desire to achieve the goals set in educational or academic settings (Karataş & Erden, 2012). Academic motivation is the desire of individuals to complete their learning tasks and their efforts to achieve the desired goals (Vanzile-Tamsen & Livingston, 1999). Factors supporting academic motivation include individuals' desires, determination to reach their goals, time management, their environment, and the issues they focus on (Wilkesmann, Fischer, & Virgilito, 2012). The way of motivation varies from individual to individual. Some individuals have extrinsic motivation, while others have intrinsic motivation (Ryan & Deci, 2000). School climate is important in increasing and decreasing students' motivation. Individuals who are happy at school want to attend more classes. Individuals who are unmotivated have problems with learning (Akbaba, 2006).

Highly motivated students tend to put in more effort. Those with low motivation are reluctant to learn and may have problems with success (Lumsden, 1994). Learning occurs if individuals embrace a motivational approach. At the same time, they need to regulate their knowledge and learning processes to make their learning more permanent. Being aware of their own learning processes and constructing their learning accordingly is essential. In this context, self-regulation skills, as well as academic motivation, play a crucial role.

Self-regulation is the planning and controlling of the processes necessary to achieve the goals individuals set for themselves (Risemberg & Zimmerman, 1992). It also involves managing or controlling various situations, learning experiences, and problems during learning (Kauffman, 2004). Self-regulation processes are explained through a social-cognitive approach, where students' self-efficacy is considered. Individuals control their work by taking into account their motivation and competencies. They can evaluate themselves and observe their plans. Self-efficacy refers to individuals' belief in their abilities. Competence and desire are crucial for success (Aydın & Demir, 2014, p. 3). Learning begins with curiosity and willingness. To spark curiosity and willingness, critical thinking is essential. Starting with curiosity and doubt allows individuals to treat situations and events from different perspectives. Critical thinking begins with asking questions and examining the answers. When using thinking skills, individuals consider multiple perspectives (Özdemir, 2008, p. 21).

While managing their learning, individuals should critically filter the information they have learned and be able to analyze it. The ability to receive, make sense of, and critically filter information is known as critical thinking. In educational settings, programs and activities are implemented to foster thinking and critical thinking. Students should first acquire questioning and empathy skills (Şahinel, 2002, pp. 50-51). The knowledge and experiences individuals accumulate throughout their lives are interpreted through conceptual groupings. The processes reached while structuring knowledge are important (Fergusson, 2003). Encouraging students to think in educational settings is crucial. Considering the goals of education, cultivating thinking individuals is a key part of the educational process. Instead of simply imparting information, students should be taught questioning skills. Receiving ready-made information without questioning leads to the loss of individuals' research abilities.

Changing individual needs and individuals' learning experiences lead to changes in individuals' learning. In particular, individual differences in individuals' learning cause differences in learning. With changing and developing technology, many ways of obtaining and accessing information are becoming easier. The important thing is to access information that will be useful to individuals and to get rid of information pollution. When individuals access information, they must filter the information by thinking critically. These processes depend on individuals being motivated and willing. The aim of this study was to examine the effect of secondary school students' self-regulation and critical thinking dispositions on their academic motivation using structural equation modeling. The sub-objective of the research is to determine the relationship between secondary school students' critical thinking tendencies and academic motivation. At the same time, its other sub-goal is to determine the predictive effect of secondary school students' critical thinking tendencies on their academic motivation.

## **METHOD**

This section presents the data collection tools, analyses, findings, and methods used in the study. It is declared that scientific and ethical principles have been followed while carrying out and writing this study and that all the sources used have been properly cited. The responsibility belongs to the author for any violations that may arise

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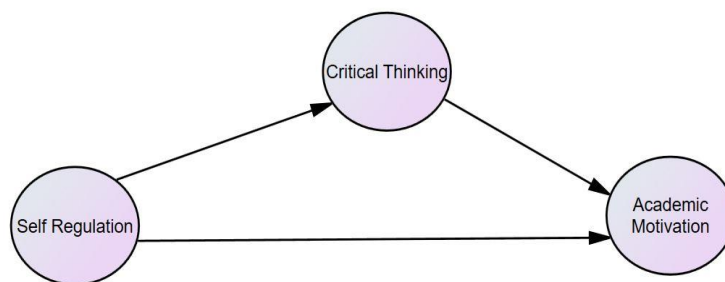
### Research Design

In the study, a quantitative research design was employed. Quantitative research is a design in which the researcher objectively records data and does not reflect personal opinions in the study (Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2015). To analyze the complex relationships between the variables in the study, structural equation modeling (SEM) was utilized. SEM is a method that tests theoretical models and explains cause-and-effect relationships. It is an approach that models errors, relationships between errors, and the interactions between structures in a multivariate manner (Kline, 2011).

A relational design was used to investigate the mediating role of critical thinking in the effect of self-regulation on academic motivation among secondary school students. Individuals' motivation and self-regulation influence their academic achievement (Özçakır-Sümen & Çalıřıcı, 2017). Self-regulation involves controlling one's work based on motivation and competence. Individuals can control their own behavior and evaluate and monitor their plans through self-assessment (Aydın & Demir, 2014, p. 3).

### Population and Sample

The population of this study consisted of secondary school students studying in Elazığ during the 2021-2022 academic year. The sample was selected using non-random convenience sampling from secondary school students in Elazığ. Convenience sampling is a method in which researchers sample participants that are easily accessible, without significant time loss, and with a larger number of participants (Büyüköztürk et al., 2015). The sample initially included 401 participants; however, 21 were excluded from the analysis due to concerns about unreliable responses on the scales.



**Figure 1.** Proposed Model of the Relationship Between Self-Regulation, Critical Thinking, and Academic Motivation among Secondary School Students

**Table 1.** Frequency and Percentage Distributions of Participants’ Demographic Variables

Demographic Variable	Groups	Frequency (n)	Percentage (%)
<b>Gender</b>	Female	211	55.5
	Male	169	44.5
	Total	380	100
<b>Grade</b>	5. Grade	83	21.8
	6. Grade	110	28.9
	7. Grade	90	23.7
	8. Grade	97	25.5
	Total	380	100
<b>Education Level of Mother</b>	Primary S.	138	36.3
	Secondary S.	77	20.3
	High S.	85	22.4
	Higher Education	80	21.1
	Total	380	100
<b>Education Level of Father</b>	Primary S.	52	13.7
	Secondary S.	75	19.7
	High S.	118	31.1
	Higher Education	135	35.5
	Total	380	100

Table 1 presents the distribution of participants based on demographic variables. The study sample comprised 380 participants. In terms of gender, 55.5% of the participants were female, and 44.5% were male. Regarding grade levels, 21.8% of the students were in 5th grade, 28.9% in 6th grade, 23.7% in 7th grade, and 25.5% in 8th grade. Looking at the mothers' education levels, 36.3% had completed primary school, 20.3% secondary school, 22.4% high school, and 21.1% university. As for the fathers' education levels, 13.7% had completed primary school, 19.7% secondary school, 31.1% high school, and 35.5% university.

**Data Collection Tools**

***Perceived Self-Regulation Scale***

The Perceived Self-Regulation Scale, developed by Arslan and Gelişli (2015), consists of 16 items, none of which are reverse-coded. The scale uses a 5-point Likert format with response options ranging from "Never" to "Always," and the maximum possible score is 80. The items are divided into two sub-dimensions: openness (items 1–8) and search (items 9–16). The overall Cronbach’s alpha for the scale is .79, with .74 for the openness dimension and .76 for the search dimension.

***Critical Thinking Disposition Scale***

The Critical Thinking Disposition Scale was developed by Yıldırım-Döner and Demir (2022). The scale consists of 21 items, with no reverse-coded items. The highest possible score on the scale is 105. It is a 5-point Likert scale, and respondents are required to choose one of the following options: "Always," "Often," "Sometimes," "Rarely," and "Never." These items are divided into three dimensions: dialectical thinking, tendency, and analysis. The

dialectical thinking dimension consists of items (6, 14, 7, 3, 13, 17, 12, 5, 16, 8, 2). The tendency dimension consists of items (18, 19, 20, 21), and the analysis dimension consists of items (1, 4, 10, 11, 15). The overall Cronbach’s alpha for the scale is .87, with values of .83 for the dialectical thinking dimension, .80 for the tendency dimension, and .64 for the analysis dimension.

**Academic Motivation Scale**

The Turkish adaptation of the Academic Motivation Scale was conducted by Yurt and Bozer (2015). The scale consists of 28 items, with no reverse-coded items. The highest possible score on the scale is 196. It is a 7-point Likert scale, and respondents are asked to select the option that best matches them. These scale is divided into 7 sub-dimensions: intrinsic motivation to know (4 items: 2, 9, 16, 23), intrinsic motivation to accomplish (4 items: 6, 13, 20, 27), intrinsic motivation to experience stimulation (4 items: 4, 11, 18, 25), introjected regulation (4 items: 7, 14, 21, 28), external regulation-extrinsic motivation (4 items: 1, 8, 15, 22), identified regulation (4 items: 24, 17, 10, 3), and amotivation (4 items: 26, 19, 12, 5). The scale showed good internal consistency, with an overall Cronbach’s alpha of .83, and the sub-dimensions ranged from .61 to .80.

**Data Analysis**

In the data analysis, descriptive statistical techniques such as mean and standard deviation were employed. Skewness and kurtosis were examined to assess the normality of the data. Structural regression modeling, which synthesizes Path Analysis and Confirmatory Factor Analysis (CFA), was applied to test both direct and indirect effects of the variables on each other (Kline, 2011). During the analysis, SPSS and AMOS were used.

**Table 2.** Descriptive Statistics for the Scales

Scales	n	$\bar{x}$	ss	Skewness	Kurtosis
Self-Regulation	380	3.70	.67	-.171	-.503
Critical Thinking	380	3.70	.69	-.089	-.526
Academic Motivation	380	4.64	.87	-.227	-.342

As shown in Table 2, the skewness and kurtosis coefficients indicated that the data followed a normal distribution. Values between +2 and -2 for skewness and kurtosis are considered indicative of normal distribution (Demir, Saatçioğlu, & İmrol, 2016).

**Table 3.** Reliability and Validity Values for the Perceived Self-Regulation Scale and Its Sub-Dimensions

	Number of Items	Cronbach	KMO	Bartlett’s Test
Self-Regulation	16	.842	.911	$x^2=1427.775$ sd=120; p=.000
Openness	8	.631	.774	$x^2=366.909$ ; sd=28; p=.000
Search	8	.816	.894	$x^2=728.207$ ; sd= 28; p=.000

The KMO and Bartlett’s tests were examined to determine the suitability of the data for principal component analysis. The KMO coefficient, which is used to determine whether the sample size is adequate, must be greater than .50. As seen in Table 3, the self-regulation, openness, and search dimensions all had values greater than .50. Bartlett’s test determines whether the variables are normally distributed and provides the Chi-square value (Çokluk, Şekercioğlu, & Büyüköztürk, 2016). As a result of the analysis, the self-regulation, openness, and search dimensions were found to be significant.

The Cronbach’s alpha for the self-regulation scale was .842, with reliability coefficients of .631 and .816 for the openness and search dimensions, respectively. A Cronbach’s alpha value of .50 or higher indicates that the scale is reliable (Özdamar, 2017).

**Table 4.** Reliability and Validity Values for the Critical Thinking Disposition Scale and Its Sub-Dimensions

	Number of Items	Cronbach	KMO	Bartlett’s Test
<b>Critical Thinking</b>	21	.881	.891	$\chi^2=2590.116$ sd=210; p=.000
<b>Dialectical Thinking</b>	12	.840	.899	$\chi^2=1071.469$ ; sd=66; p=.000
<b>Tendency</b>	4	.859	.815	$\chi^2=672.560$ ; sd= 6; p=.000
<b>Analysis</b>	5	.615	.720	$\chi^2=177.345$ ; sd= 10; p=.000

The KMO and Bartlett’s tests were examined to determine the suitability of the data for principal component analysis. The KMO coefficient must be greater than .50. As seen in Table 4, the critical thinking, dialectical thinking, tendency, and analysis dimensions had values greater than .50. Bartlett’s test provides the Chi-square value, determining whether the variables are normally distributed (Çokluk, Şekercioğlu, & Büyüköztürk, 2016). The analysis found the critical thinking, dialectical thinking, tendency, and analysis dimensions to be significant.

The Cronbach’s alpha values for the scale were calculated, and the total reliability of the critical thinking scale was found to be .881. The reliability coefficients for the dialectical thinking, tendency, and analysis dimensions were .840, .859, and .615, respectively. A Cronbach’s alpha value of .50 or higher indicates that the scale is reliable (Özdamar, 2017).

**Table 5.** Reliability and Validity Values for the Academic Motivation Scale and Its Sub-Dimensions

	Number of Items	Cronbach	KMO	Bartlett’s Test
<b>Academic Motivation</b>	28	.851	.907	$\chi^2=3699.208$ sd=378; p=.000
<b>Intrinsic Motivation to Know</b>	4	.762	.762	$\chi^2=360.165$ ; sd=6; p=.000
<b>Intrinsic Motivation to Accomplish</b>	4	.618	.675	$\chi^2=180.232$ ; sd= 6; p=.000
<b>Intrinsic Motivation to Experience</b>	4	.685	.722	$\chi^2=235.762$ ; sd=6; p=.000

<b>Introjected Regulation</b>	4	.725	.746	$\chi^2=289.229$ ; sd=6; p=.000
<b>External Regulation-Extrinsic Motivation</b>	4	.496	.621	$\chi^2=95.420$ ; sd= 6; p=.000
<b>Identified Regulation</b>	4	.716	.737	$\chi^2=280.789$ ; sd=6; p=.000
<b>Amotivation</b>	4	.813	.780	$\chi^2=522.637$ ; sd= 6; p=.000

The KMO and Bartlett's tests were used to determine the suitability of the data for principal component analysis. The KMO coefficient was greater than .50 for all dimensions, indicating that the sample size was adequate. Bartlett's test showed that the data were normally distributed (Çokluk, Şekercioğlu, & Büyüköztürk, 2016). The analysis found all dimensions of academic motivation to be significant.

The internal consistency of the scale was measured using Cronbach's alpha, yielding a total reliability score of .851 for the academic motivation scale. The sub-dimensions showed good reliability, with Cronbach's alpha values ranging from .61 to .81.

**FINDINGS**

This section presents the results of assessing secondary school students' self-regulation, critical thinking skills, academic motivation, and the relationships among these variables.

**Table 6.** Results of Pearson Correlation Analysis For Scores from the Perceived Self-Regulation, Critical Thinking Disposition and Academic Motivation Scales

Scales	Perceived Self-Regulation	Critical Thinking Disposition	Academic Motivation
<b>Perceived Self-Regulation</b>	1	.70**	.49**
<b>Critical Thinking Disposition</b>	.70**	1	.45**
<b>Academic Motivation</b>	.49**	.45**	1

\*\*p<.01

As seen in Table 6, a strong positive correlation (r=.70) was found between the self-regulation and critical thinking. A moderate positive correlation (r=.49) was found between the participants' self-regulation and academic motivation scores. In addition, a moderate positive correlation (r=.45) was found between critical thinking and academic motivation scores.

**Table 7.** Goodness of Fit Results for the First-Level CFA of the Perceived Self-Regulation Scale

	Fit Values	Acceptable Fit
<b><math>\chi^2/df</math></b>	1.675	$\chi^2/df \leq 5$
<b>RMSEA</b>	.042	$\leq 0.08$
<b>GFI</b>	.945	$\geq 0.80$
<b>AGFI</b>	.927	$\geq 0.80$
<b>CFI</b>	.948	$\geq 0.80$



As seen in Table 7, the fit index values of Perceived Self-Regulation Scale were at acceptable levels. The CMIN/df value should be less than 5 for acceptable fit (Meydan & Şeşen, 2015). GFI, AGFI, and CFI values should be greater than 0.80 (Byrne, 1999). The RMSEA value should be less than 0.08 (Carlbak & Wong, 2018).

**Table 8.** Goodness of Fit Results for the First-Level CFA of the Critical Thinking Disposition Scale

	Fit Values	Acceptable Fit
$\chi^2/df$	2.654	$\chi^2/df \leq 5$
RMSEA	.066	$\leq 0.08$
GFI	.888	$\geq 0.80$
AGFI	.861	$\geq 0.80$
CFI	.874	$\geq 0.80$

As seen in Table 8, the fit index values of Critical Thinking Disposition Scale were at acceptable levels. The CMIN/df value should be less than 5 for acceptable fit (Meydan & Şeşen, 2015). GFI, AGFI, and CFI values should be greater than 0.80 (Byrne, 1999). The RMSEA value should be less than 0.08 (Carlbak & Wong, 2018).

**Table 9.** Goodness of Fit Results for the Second-Level CFA of the Critical Thinking Disposition Scale

	Fit Values	Acceptable Fit
$\chi^2/df$	2.455	$\chi^2/df \leq 5$
RMSEA	.062	$\leq 0.08$
GFI	.909	$\geq 0.80$
AGFI	.882	$\geq 0.80$
CFI	.903	$\geq 0.80$

As seen in Table 9, the fit index values were at acceptable levels. The CMIN/df value should be less than 5 for acceptable fit (Meydan & Şeşen, 2015). GFI, IFI, and CFI values should be greater than 0.80 (Byrne, 1999). The RMSEA value should be less than 0.08 (Carlbak & Wong, 2018).

**Table 10.** Goodness of Fit Results for The First-Level CFA of the Academic Motivation Scale

	Fit Values	Acceptable Fit
$\chi^2/df$	2.227	$\chi^2/df \leq 5$
RMSEA	.058	$\leq 0.08$
GFI	.863	$\geq 0.80$
AGFI	.831	$\geq 0.80$
CFI	.87	$\geq 0.80$

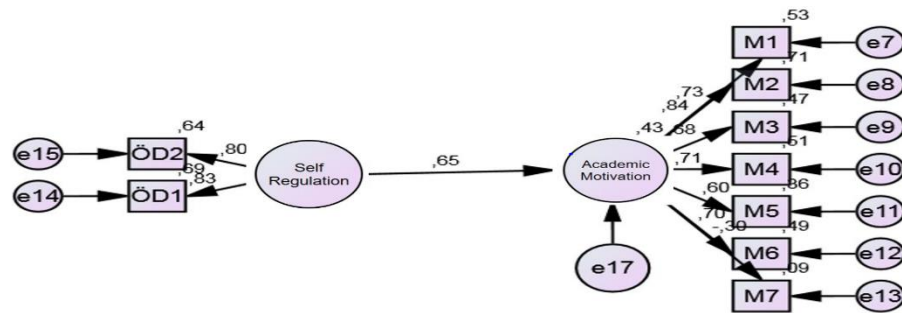
As seen in Table 10, the fit index values of Academic Motivation Scale were at acceptable levels. The CMIN/df value should be less than 5 for acceptable fit (Meydan & Şeşen, 2015). GFI, AGFI, and CFI values should be greater than 0.80 (Byrne, 1999). The RMSEA value should be less than 0.08 (Carlbak & Wong, 2018).

**Table 11.** Goodness of Fit Results for the Second-Level CFA of the Academic Motivation Scale

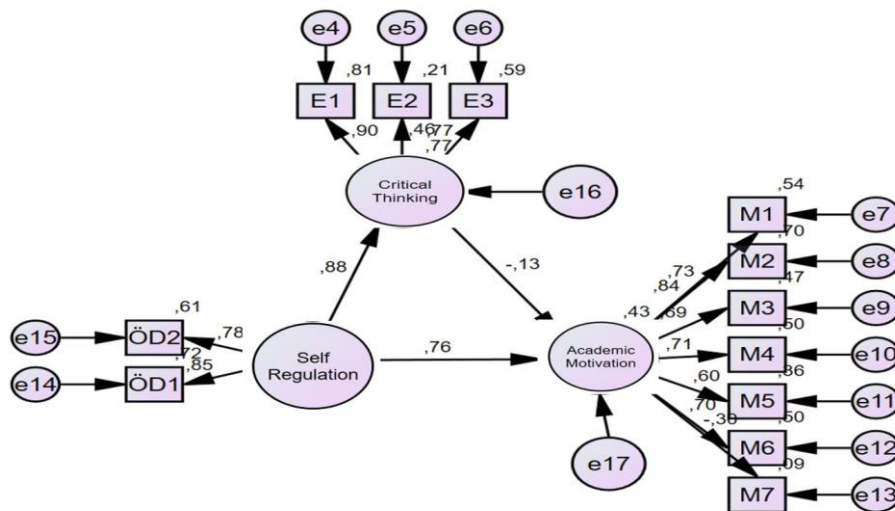
	Fit Values	Acceptable Fit
$\chi^2/df$	2.378	$\chi^2/df \leq 5$
RMSEA	.060	$\leq 0.08$

GFI	.851	≥0.80
CFI	.863	≥0.80
AGFI	.823	≥0.80

As seen in Table 11, the fit index values were at acceptable levels. The CMIN/df value should be less than 5 for acceptable fit (Meydan & Şeşen, 2015). AGFI, GFI, and CFI values should be greater than 0.80 (Byrne, 1999). The RMSEA value should be less than 0.08 (Carlbak & Wong, 2018).



**Figure 2.** Path Analysis Diagram Showing the Effect of Self-Regulation on Academic Motivation



**Figure 3.** Path Analysis Diagram Showing the Effect of Critical Thinking on Academic Motivation as a Mediating Variable

**Table 12.** The Mediating Role of Critical Thinking in the Effect of Self-Regulation on Academic Motivation

Effect (Without Mediator)	Estimate (β)	Standard Error	t	p	Result
Self-Regulation → Academic Motivation	0.654	0.129	9.514	***	Kabul
Direct Effect (With Mediator)	Estimate (β)	Standard Error	t	p	Result
Self-Regulation → Critical Thinking → Academic Motivation	0.765	0.340	4.162	***	Kabul
Indirect Effect (With Mediator)	Estimate (β)	Confidence Interval			
Self-Regulation → Critical Thinking → Academic Motivation	-0.129	(-0.558, 0.178)			Significant (Mediation exists)

**Fit Indices:**  
 $\chi^2/df$ : 3.520 , RMSEA:0.08 , GFI: 0.92 , AGFI: 0.88, CFI:0.93

A model was developed to assess whether critical thinking mediates the effect of self-regulation on academic motivation. Before investigating the mediating role, the effect of the independent variable on the dependent variable was analyzed. The results indicated that self-regulation had a significant and strong positive effect on academic motivation in the absence of a mediator ( $\beta = 0.654$ ,  $t = 9.514$ ,  $p < 0.05$ ).

After confirming the significant effect of the independent variable on the dependent variable, the presence of a mediating role was examined. When critical thinking was introduced as the mediating variable, the strength of the relationship increased from .65 to .76. It was found that self-regulation and critical thinking as a mediator explained 43% of academic motivation. The confidence interval of the obtained model at the 95% level did not contain zero, indicating that the mediating role in the model is significant (-0.558, 0.178). After determining the existence of a mediating role, the type of mediation was assessed by examining whether the direct effect remained significant. It was concluded that the direct effect was significant, the effect size increased, and it had a strong impact ( $\beta = -0.765$ ,  $t = 4.162$ ,  $p < 0.05$ ), leading to the conclusion that the mediation was partial.

## **CONCLUSION and DISCUSSION**

The aim of this study was to examine the relationships between secondary school students' self-regulation, critical thinking dispositions, and academic motivation using structural equation modeling. A model was developed to determine whether critical thinking serves as a mediating variable in the effect of self-regulation on academic motivation. The results showed that, even without the mediator, self-regulation has a significant and strong positive effect on academic motivation. These findings suggest that as students' academic motivation increases, the relationship between self-regulation and critical thinking also strengthens. This implies that when students take responsibility for managing their own learning processes, they become more motivated to acquire knowledge.

Furthermore, the study indicates that when individuals critically reflect on their learning processes and structure their knowledge accordingly, they are more likely to sustain their motivation. Motivated students tend to engage more actively in the learning process and examine information in greater detail, which in turn develops their critical thinking skills. Analyzing and producing knowledge through critical thinking further enhances motivation. In addition, individuals who manage their own learning processes tend to have higher self-regulation skills and feel more academically motivated.

According to the results of the study, self-regulation impacts academic motivation even in the absence of a mediator. When students manage their own learning processes, they are more eager and motivated to engage in their studies. In a study by Kılıç and Beyazıt (2019) involving secondary school students, the researchers aimed to determine the regulatory role of self-regulation in the relationship between academic motivation and metacognition. They found that self-regulation plays a regulatory role in the relationship between academic motivation and metacognition. When self-regulation is high, metacognition also increases, and academic motivation is more strongly influenced by metacognition.

Similarly, Özçakır-Sümen and Çalışıcı (2017) conducted a study to examine the effects of self-regulation and motivation on academic achievement among eighth-grade students. They found a moderate relationship between self-regulation and motivation, and concluded that both contribute to academic success.

Kılıç and Beyazıt (2019) found a relationship between self-regulation and metacognition, Tuncer, Yanpar-Yelken, and Tanrıseven (2018) identified a connection with inquiry skills, Aydın and Çekim (2017) with perceptions of success, Nayir and Tekmen (2017) with problem-solving skills, Yılmaz, Taşkesen, and Taşkesen (2016) with academic achievement, and Taşkın (2016) with value orientation. Other studies, such as Husain (2014); Alemdağ, Öncü, and Yılmaz (2014), found links with self-efficacy, Karataş (2011) with problem-solving and epistemological beliefs, Eryılmaz (2010) with subjective well-being, and Brouse, Basch, Leblanc, Mcknight, and Lei (2010) with demographic variables. These studies indicate that when individuals manage their learning processes, they can control their cognition, foresee their future success, and manage problems in their learning environments.

In addition, the study found that critical thinking acts as a mediator in the effect of self-regulation on academic motivation. Both critical thinking and self-regulation influence academic motivation. When students engage eagerly in the learning process, it positively affects their ability to analyze information. Organizing information based on their learning styles plays a crucial role in analyzing that information. Dunn, Rakes, and Rakes (2014) examined the effects of critical thinking and academic self-regulation, concluding that as critical thinking and academic motivation increase, so does the behavior of seeking help. Furthermore, several studies explore the relationship between critical thinking and self-regulation. For instance, Altay (2013) and Mete (2021) found links to reading habits and maternal education level, Arı (2020) to critical thinking-based teaching, Ulusoy and Karakuş (2018) to self-directed learning, Astuti, Dasmo, Nurullaeli, and Rangka (2018) to mobile applications, and Dökmecioğlu (2017), Uzuntiryaki-Kondakçı (2013), and Ghanizadeh and Mirzaee (2012) to self-regulation. Akar and Kara (2016) explored the relationship between TV watching and gender, Karaman (2016) focused on media literacy, Erdem, İlğan, and Çelik (2013) examined emotional intelligence levels, and Karabacak (2011), Saçlı, and Demirhan (2008) found relationships between gender and class.

Many studies have also examined the variables that affect academic motivation. Kılıç and Beyazıt (2019) found a relationship between self-regulation and metacognition, Tuncer, Yanpar-Yelken, and Tanrıseven (2018) identified links with inquiry skills, Aydın and Çekim (2017) with perceptions of success, Nayir and Tekmen (2017) with problem-solving skills, Yılmaz, Taşkesen, and Taşkesen (2016) with academic achievement, Taşkın (2016) with value orientation, Husain (2014); Alemdağ, Öncü, and Yılmaz (2014) with self-efficacy, Karataş (2011) with problem-solving and epistemological beliefs, Eryılmaz (2010) with subjective well-being, and Brouse, Basch, Leblanc, Mcknight, and Lei (2010) with demographic variables. These studies indicate that individuals tend to take more action toward desired and targeted behaviors. Motivated individuals are more willing to manage their learning processes and more determined to fulfill their responsibilities. It is important for motivated individuals to structure their well-being during the course of their lives.

## SUGGESTIONS

To make the results more generalizable, future studies could be conducted with larger samples. In addition, this research could be repeated with different variables. Activities could be designed for classroom guidance programs to enhance students' self-regulation, critical thinking, and academic motivation. The study could also be extended using experimental research methods, which are part of quantitative research. Moreover, this study could be further detailed using qualitative research methods. Current educational programs could incorporate activities aimed at increasing students' motivation, critical thinking, and self-regulation, which could, in turn, boost their desire for learning.

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- All data related to the article is included in the article.

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