

The Structural Model of Students' Academic Motivation Based on Teacher-Student Relationship, Attachment to School, and Metacognitive Awareness by the Mediator of Academic Optimism among High-School Students

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Abstract

Background: It is a widely acknowledged fact that the future lies in the hands of the next generation whose success is mainly dependent on education. The purpose of the present study was to investigate the structural model of students' motivation based on the teacher-student relationship, school attachment, and metacognitive awareness by academic optimism. The method of correlation was structural equation modeling.

Methods: The structural equation modeling correlation was the method used in this research. The statistical population of this study consisted of 500 students selected from all male and female high schools in 22 districts of Tehran in the academic year 2017-2018. The Harter Academic Motivation Questionnaire (MIT), Teacher-Student Relationship, Attachment to the Motown School, Mokhtari and Richard Metacognitive Awareness, Academic Optimism were responded. For data analysis, we used Pearson's correlation with SPSS software version 20 and path analysis with Amos software. The level of significance was $P > 0.01$.

Results: The results showed that the relationship between teacher-student with academic motivation by mediator role of academic optimism was significant (total effect=0.633, $P=0.002$), (direct effect=0.286, $P=0.002$), and (indirect effect=0.377, $P=0.002$). Furthermore, Attachment to school had a positive association with academic motivation. Finally, the relationship between metacognitive awareness with academic motivation by mediator role of academic optimism was significant (Total effect=0.351, $P < 0.001$).

Conclusion: Given the findings of the present study on the importance of the mentioned variables in students' academic motivation, it is suggested that school principals provide positive, active, and vibrant school environment by developing optimistic beliefs in students. Provide students with academic motivation.

Keywords: Academic, Motivation, Teacher-student relationship, Metacognition, Optimism

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1. Introduction

Academic motivation is one of the topics that has attracted psychologists and educators over the recent years (1). Researchers in educational and academic fields see academic motivation as an important predictor of future success and mental health (2). There are many studies that considered the motivation components of expectation and interest as predictors of students' academic achievement (grades or test scores) (3-5). Numerous studies have shown that motivational factors lead to cognitive involvement and learner's control over the learning process and attachment to school (6). Based on Vettori and colleagues. Academic motivation is important because it is not only one of the key factors in learning, but also a mediator of learning

patterns and learning outcomes (7). It is one of the most influential and applied constructs in the field of education (8). Motivation orientation is related to the basic attitudes and goals that sometimes drive activity to action and behavior (9). Numerous studies have emphasized the important role of academic motivation in achieving academic success (10, 11).

Teacher-student communication is one of the most fundamental interpersonal interactions in school and a form of sustained cognitive, behavioral, and emotional communication that gradually develops during long-term interactions between students and teachers and is highly relevant to student's academic motivation (12). Many studies have found that a supportive teacher-student relationship increases students' academic

motivation (13-15). Such positive relationship can further affect the emotional and social relationship of the students, create academic motivation, increase the willingness to attend school, engage students in classroom activities, make them try hard to deal with problems, and create responsibility (16-18). In other words, students who have a warm and intimate relationship with their teachers are highly self-esteemed, have an interest in their teacher, are more driven to learn, have a positive attitude towards school, and are welcomed by their peers and classmates (19, 20).

As already stated, the interaction of the teacher with the students create academic engagement and a sense of belonging and attachment to school (21, 22), which is also one of the factors that can influence students' academic motivation (21). Attachment to school refers to the relationships one has with school and other aspects of school life (22). Students' attachment to school is a variable that is critical to learning (12). Student's motivation for academic achievement, their success in school, reduction in high-risk behaviors in schools, successful involvement in school activities, involvement in classroom activities, academic resilience, school absenteeism, and intrinsic motivation play a significant role because they enhance the student's attachment to school learning and engagement objectives (23). The mediating role of school involvement was analyzed in terms of the relationship between teacher-student interactions and academic achievement. Meta-analytic structural equation modeling found that, overall, the correlations between both positive and achievement relationships and negative relationships and achievement were partly mediated by student's participation. Subsequent analyses revealed that mediation develop both to elementary and secondary schools (24). A few meta-analyses investigated the relationships between the sense of belonging (as dependent variable) of high school students and a wide variety of student variables, such as academic motivation, parental support, and teacher support (25-27).

Another relevant aspect is metacognition and understanding success regarding the principle of motivation and academic passion (28). Today, developing countries' education systems concentrate primarily on cognitive-based learning and metacognitive learning approaches (29-30). On the other hand, metacognition is a form of cognition that monitors the cognitive processes of action (31). Metacognitive awareness affects students' better decision-making and the problems they face during schooling; it also enhances their academic motivation, and there exists a significant

positive relationship between metacognitive awareness and academic motivation (32). In recent years, the emphasis has been placed on education aimed at promoting metacognitive awareness among learners to boost their academic motivation (30-33). We hope that through applying these strategies, we can improve students' academic motivation, thereby enabling them to improve their academic performance.

As for academic improvement in colleges, the achievement is said to be the result of talent and encouragement. Seligman (34) considered optimism as the third element following talent and motivation, with the same importance. Optimism, which can be learned and developed, is the attitude of a person towards their ability to carry out different tasks (self-efficacy). Academic optimism generates and maintains school culture as an organizational and personal characteristic, aiding teachers in creating positive attitudes about themselves. Teachers are also encouraged to emphasize the scientific importance of fulfilling educational tasks and seek to promote an optimistic and happy scholastic atmosphere (35). Students' academic optimism reflects a rich picture of a human entity describing their behavior in the cognitive, emotional, and behavioral dimensions (36).

One of the effective factors for academic motivation is significant relationship with academic optimism (37, 38). Optimists are more confident about achieving the goal and experience less anxiety during schooling while pessimists are hesitant to reach goals and experience anxiety and discomfort more than optimists (39). Optimism is one of the most important components of psychology in positive psychology that aims to change and enhance the quality of life. This view seeks to utilize human strengths to prevent psychological problems (34). Del Mar Ferradas and colleagues (40) concluded that there was a significant negative relationship between academic disabilities and academic optimism and academic motivation. It has also been shown that teaching metacognitive awareness, even for a short time, is one of the most effective interventions in promoting academic motivation, reducing and regulating negative emotions, problem-solving, and decision making in students (41).

Because previous studies separately examined the relationship between each of the foregoing variables with academic motivation, there is a lack of research that can simultaneously analyze all relationships within a model. Therefore, this research attempted to analyze all variables to underline the psychological

factors influencing motivation in relation to important variables of / the mediating role of academic optimism in students based on the theoretical fit model. The objective was to present a result in the context of structural equation modeling for the first time. In addition, the results should pave the way for future research and plans in this field.

2. Methods

The structural equation modeling correlation was the method used in this research. The statistical population of this study comprised 500 students, aged 17 and 18 years, selected from all male and female high school students in 22 districts of Tehran in the academic year 2017-2018. We selected the samples via Cochran formula and multi-stage sampling method. Therefore, five regions were randomly selected from each geographical area of Tehran, including 19-14-6-5-1 (south=19, 14=east, 6=center, 5=west, and 1=north). Afterwards, five to seven high schools (female and male) were chosen and asked to support the researcher after collaboration with high school officials and directors. Four to Five tenth and twelfth grade students (girls and boys) from the fields of applied sciences, mathematics, and humanities were randomly selected. Five questionnaires gathered the information required for interpretation and research. The students were asked to answer the questionnaires following the necessary coordination with the school principals. It took four months to complete each questionnaire because five questionnaires had to be filled out. The design of the questionnaires and the study method followed ethical concepts. Therefore, students who were unwilling to complete the questionnaires were excluded from the study; the questionnaires did not include sensitive details such as name and surname. An explanatory statistics index (including frequency distribution table, average standard quantitative deviation, and elongation) was used to analyze the data; we analyzed the descriptive statistics using SPSS-20 statistical software. We employed the Kolmogorov-Smirnov test to determine the normality of the data, the confirmatory factor analysis to examine the validity of the testing methods and the testing model check, and Amos-24 software to analyze the results of the structural equation analysis (SEM). This article was part of a doctoral dissertation written by the first author in the field of educational sciences with approval number 10120702971001/98 of the research deputy of the Faculty of Psychology and Educational Sciences, Islamic Azad University, Tehran Center Branch.

Individual profile form: In this form, the researcher

collected the demographic information from the subjects, including the number, gender, and area of study, age, grade, and field of study.

Academic Motivation Questionnaire: We used the modified version of the Harter Scale (1980/1981) to assess academic motivation (42). The original Harter scale version evaluates academic motivation by bipolar questions that involve internal and external motivations. The items in this questionnaire were scored based on a Likert-scale ranging from one (never) to five (almost always). Of course, this scoring system was reversed for questions 3, 4, 5, 9, 10, 15, 16, 19, 21, 27, and 31. The questionnaire's total score was specified by summing up the scores of the items, with higher scores indicating greater academic motivation. The score ranged from 33 to 165. The Harter motivation questionnaire contains 33 questions that assess academic motivation through bipolar questions, one pole is related to internal motivation, and the other is external motivation. The response to the questions may have an inner or outer explanation. The coefficients of validity were 0.81 and 0.52 for the overall scale of internal and external motivation; moreover, it varied from 0.58 to 0.78 for the subscales. The alpha coefficient was 0.87 for the internal motivation scale, 0.67 for the external motivation scale, and 0.60-0.82 for subscales. In a study performed by Samvi and Najjarpurian (43) on 390 high school students, the reliability coefficient of the internal motivation scale was 0.81 for Cronbach's alpha and 0.86 for the external motivation scale.

Teacher-Student Relationship Questionnaire (IT-SR): Murray and Zovich developed this questionnaire to measure the teacher-student relationship (44). This questionnaire is comprised of three components, namely relationship (items 4, 9, 8, 10, 11, 12) trust (items 1, 2, 3, 13, 7), and alienation (items 6, 16, 5, 14) adjusted based on the Likert quadratic spectrum (never=1, sometimes=2, often=3, always=4). Higher scores indicate better communication quality. Cronbach's alpha coefficients of correlation coefficients (0.89), confidence (0.84), and alienation (0.72) along with the convergent and divergent validity coefficients of all three subscales of this questionnaire significantly correlated with social support scale for children and adolescents (44). Daliri and Pirieh (45) examined the content validity of this questionnaire and reported its reliability coefficient (0.72) using Cronbach's alpha method.

Metacognitive Awareness Questionnaire (MAI): Mokhtari and Richard (46) developed this

questionnaire to measure students' cognition of their study. This questionnaire has three components: overall study strategies (items 1, 3, 4, 7, 10, 14, 17, 19, 22, 23, 25, 26, 29), problem-solving study strategies (items 8, 11, 13, 16, 18, 21, 27, 30), and supportive study strategies (items 2, 5, 6, 9, 12, 15, 20, 24). Responses to each option are scored based on a five-point Likert scale (1=Never, 2=Rarely, 3=Occasionally, 4=Mostly, 5=Always). Hemmati and colleagues determined the reliability of Cronbach's alpha coefficient, calculated to be 0.90 (47).

Academic Optimism Questionnaire: Developed by Tschannen-Moran and colleagues. (36), this questionnaire consists of four questions. The test indicates agreement or disagreement with the items using a five-point Likert scale (strongly disagree=1, disagree=2, disagree=3, agree=4, and strongly agree=5). The questionnaire has three subscales, namely students' academic emphasis (items 18-11), students' confidence in teachers (items 10-1), and students' sense of identity towards school (items 19-28). In a recent study on this questionnaire by Tschannen-Moran and colleagues. (36), the reliability of the questionnaire was 0.80, 0.83, and 0.91 for trust, emphasis, and sense of identity, respectively. In Mehrian and colleagues's study, Cronbach's alpha coefficient was 0.92, the confidence components were 0.86, the academic focus was 0.78, and the sense of school identity was 0.83 (48).

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Center Branch.

3. Results

The study was conducted on 500 high school students in Tehran, out of whom 257 (51%) were girls and 243 (48%) were boys aged between 16 and 18 years. Results showed that most of the students (37.8%) were 17 years old and the frequency of 18-year-olds was lower than the other two age groups. The participants belonged to districts one (19%), five (22%), six (25%), 14 (14%), and 19 (20%). Participants were selected from three groups of mathematics (36.6%), applied sciences (35.4%), and humanities (28%). Table 1 reports the descriptive characteristics of the research variables. The tilting and elongation range did not exceed 2- to +2 levels, meaning that the data had both significant tilting and normal thresholds.

To study the structural equation model, one of the most important assumptions in the model is the number of factors used in the model. Supported by the ultimate SEM model, structural equation modeling involves a family of multivariate statistical methods that simultaneously investigate the relationships between apparent and hidden variables or indirectly through the measured variables.

Research hypothesis addressed the mediating role of academic optimism between teacher-student relationships, school attachment, and metacognitive awareness with academic motivation. Similar to the previous question, this hypothesis first examines the appropriateness of the model. In this study, as shown in the model, the standardized coefficient loading ranged

Table 1: Descriptive characteristics of research variables (n=500)

	Min	Max	M	SD	Skewness	Kurtosis
Relationship	8	32	17.3	7.8	60.9	0.226
Protection	5	20	11.7	4.9	24.3	0.134
Alienation	4	16	8.8	3.6	13.5	0.369
Total Relationships	8	35	23.6	7.1	51.3	-0.105
Belong	4	20	13.2	3.4	12.0	-0.462
Special attachments	17	41	27.9	3.6	13.1	0.143
Total	12	60	48.7	4.2	104.5	-1.000
Problem Solving	8	40	27.1	8.3	69.1	-0.414
Supportive	9	44	29.4	8.7	77.2	-0.370
Intrinsic motivation	22	85	47.9	7.6	57.8	0.658
External Motivation	21	78	45.6	50.8	118.3	0.205
Academic emphasis	9	40	27.9	8.7	76.0	-0.051
Students' trust	13	50	30.2	9.6	93.7	0.304
Students' identity towards the school	10	50	32.5	11.2	125.8	0.183

*SD: Standard Deviation

from 0.11 to 0.79, and the SMC varied between 0.09 and 0.72. The results of statistical measures of fitting indices (GOF) showed that Chi-square χ^2 (df=64)=98,549, which was significant at the level of 000. The value of cmin / df was equal to 1,540. Comparative correction index (CFI)=0.906, which was acceptable as it was greater than 90. Furthermore, the value of (IFI)=912, which is larger than the acceptable value of 90 and suitable for showing a fit. Also, approximate error (RMSEA)=0.033 indicates model fit. The results of the fit indices can be seen in Table 2 and Figure 1.

As shown in Table 3, the relationship between teacher-student with academic motivation by mediated role of academic optimism was significant (total effect=0.633, P=0.002), (direct effect=0.286, P=0.002) and (indirect effect=0.377, P=0.002). Considering the findings, academic optimism plays a mediating role in the relationship between teacher-student motivation and academic motivation (Total effect=0.277, P=0.113), (direct effect=0.198, P=0.113), and (Indirect effect=.079, P=0.113). Furthermore, Attachment to school had a positive association with academic motivation. Finally, the relationship

between metacognitive awareness with academic motivation by mediator role of academic optimism was significant (Total effect=0.351, P<0.001), (Direct effect=0.371, P<0.001), and (Indirect effect=0.034, P<0.001).

4. Discussion

The aim of this study was to investigate the association between academic motivation and teacher-student relationships, school attachment, and metacognitive awareness, and the mediating role of academic optimism in students. The results of this study showed that the relationship between teacher-student and academic motivation with the mediation of academic optimism was significant, meaning an entire mediator connection was established.

In other words, academic optimism plays a significant mediating role in the correlation between teacher-student relationships and academic motivation. This finding is consistent with many of the previous research, such as Nasab and colleagues. (35), Tschannen-Moran and colleagues. (36), Mitchell & Tarter (37), Mitchell

Table 2: Structural equation model fitting indices

Chi-square	DF	P	cmin/df	GFI	IFI	CFI	RMSEA
98,549	64	<0.001	1.540	0.973	0.912	0.906	0.033

*DF: Degrees of Freedom, CMIN/DF: the minimum discrepancy divided by its degrees of freedom, *CFI: Comparative Fit Index, *IFI: An international financial institution, *GFI: Goodness of Fit Index, *RMSEA: Root Mean Square Error of Approximation)

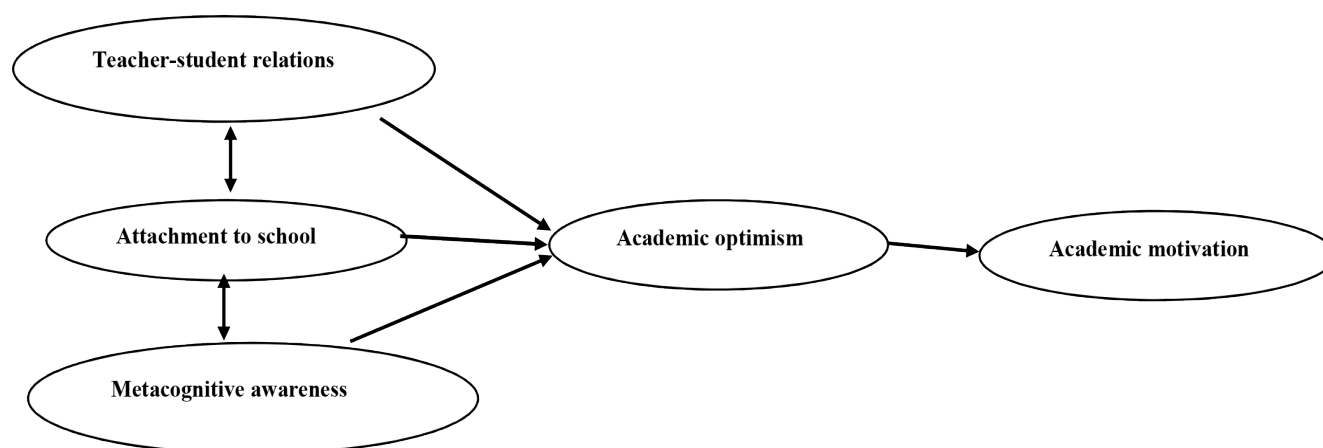


Figure 1: Proposed Structural Equation Modeling for Teacher-Student Relationship, School Attachment, and Metacognitive Awareness with Academic Motivation and the Presence of Academic Optimism

Table 3: Full effect, direct and indirect effect between variables and outcome of mediating effect of academic optimism

Independent variable	Total effect	Direct effect	Indirect effect	P	Result
Teacher-student relationship ->Academic motivation	0.633	0.286	0.377	0.002	Complete mediation
Attachment to school ->Academic motivation	0.277	0.198	0.079	0.113	No effect
Metacognitive Awareness -> Academic Motivation	0.351	0.371	0.034	<0.001	Complete direct effect

& Tarter (38), and Safari & Soleimani (39). These studies showed the two-way association of academic motivation and teacher-student relationship with academic motivation. Contrary to the results of this study, Emadi and Ganji Khankedani (49) reported no significant relationship between academic motivation and optimism, and high academic motivation in the students of second-grade high school in Isfahan was not able to predict their optimism concerning the future. Del Mar Ferradas and colleagues. (40) concluded that there was a positive and meaningful relationship between academic self-efficacy and the variable of pessimistic defensive strategies that had a negative significant relationship with academic optimism. They also observed that among the variables of optimism and pessimistic defense strategies, optimism was a stronger predictor of academic self-efficacy.

To explain this finding, positive principals and teachers play an important role in enhancing the academic achievement and motivation of students; they also trust each other in schools with high academic optimism, staff, students, and parents, which creates a sense of empathy (39). In fact, there is a strong and significant relationship between students' academic emphasis, trust in teachers, and a sense of school identity, which may lead to students' academic optimism (38). In other words, when a teacher uses a human-centered style of control, academic optimism is also low (50). Optimism components include self-efficacy, confidence, and academic focus, which foster an educational atmosphere with features such as in-school performance, a positive relationship between school and family, and high school expectations. Teachers' trust in parents and students establishes a constructive collaboration between students, parents, and teachers, offering a supportive relationship between parents and schools. Academically optimistic schools and teachers have students that are strongly inspired by their revolutionary goals, hard work, perseverance, stamina, and positive feedback (35-39).

The other results suggested a significant structural relationship between academic-optimism and academic-motivation, so we can infer that academic-optimism can predict academic-motivation. This finding is in line with previous studies such as Darling-Hammond and colleagues (12) and Cadima and colleagues (17). Darling-Hammond and colleagues. (12) found that if students were to meet their standards of motivation, appreciation, and satisfaction levels, they would have a better attitude towards school and teachers. To clarify these findings, it is important

to understand when teachers discuss topics such as student engagement and commitment, opportunities to question their learning and develop positive social relationships, track the whole classroom, highlight the key points of the lesson, describe the response, and provide guidance. Students have been found to have a higher degree of mathematical competence, acceptable attitudes, and optimistic evaluations of their academic skills. Compared with structural features (classroom size), these behaviors have more effect on the motivation and academic achievement of students and improved learning outcomes (17).

Finally, the study of the relationship between metacognitive awareness and academic motivation with the role of academic optimism mediation has been shown a significant effect. In Iran, research on cognitive and metacognitive awareness has also expanded over the past two decades. Many of these studies showed the positive impact of motivational metacognitive awareness and academic performance in different courses (47-49). Hemmati and colleagues. (47) showed that unlike metacognitive knowledge, learning methods had the predictive power of academic motivation directly. Metacognitive knowledge should strive to promote systems in students relating to academic motivation.

In a related review, Tash and Chakir (50) observed clear association between metacognitive knowledge and motivational beliefs components. In a study concluded that planning had a positive and meaningful relationship with self-esteem, cognitive conflict, uncontrollability, and the need to control thoughts with self-inadequacy. Furthermore, the findings of multiple regression analysis showed that academic optimism, positive metacognitive awareness, and adaptive strategies for controlling cognitive emotions negatively predicted academic self-disability while negative metacognitive awareness and maladaptive cognitive emotion control strategies positively predicted academic self-disability. The constructive educational framework, derived from positivist psychology, typically helps establish a positive atmosphere in school. Academic optimism and encouraging environment are closely associated with high academic achievement. Teachers, students, and parents have shared confidence in schools with strong academic optimism, which generates empathy (51). In reality, optimism for students is an individual belief affected by environmental factors. This belief implies that if there is mutual trust between students and teachers, features of academic focus in the community, and a sense of solidarity with the educational setting,

the individual is highly motivated and effective (52).

One of the limitations of the present study was the questionnaire with its own reporting aspects. For this reason, encountered problems and biases in accountability. It is recommended that this study be used with other predictive variables such as personality, emotion, and variables. There seem to be several variables that can better explain the mediating role of disability, including personality traits, emotion regulation, and anxiety levels. It is hoped that in future research, these variables will be examined more closely in relation to self-efficacy and its role in reducing students' academic motivation.

5. Conclusion

According to the results of this study, it is proposed that teachers increase their level of attachment to school by creating warm and intimate relationships, which in turn augments academic motivation. Therefore, school principals should create conditions for students' academic motivation by creating optimistic beliefs in themselves and expanding a positive, active, and vibrant school environment. Future studies should also examine the role of mediating factors such as mental attitudes and emotions in the form of structural models.

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Ethical Approval

This study is part of a PhD thesis written by the first author. The Ethics Committee of Islamic Azad University of Tehran Center Branch (IR.IAU.TCB.REC.1398.0120702971001) approved the study. The participants voluntarily participated in the present study, and the subjects and their parents signed written informed consent.

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