

The effect of metacognitive skills and academic motivation on academic performance

Mehdi Eskandari

Shiraz University of Medical Sciences

Mitra Amini (✉ aminim@sums.ac.ir)

<https://orcid.org/0000-0002-7332-5151>

Somayeh Delavari

Tehran University of Medical Sciences <https://orcid.org/0000-0001-7451-3077>

Sedigheh Mokhtarpour

Shiraz University of Medical Sciences

Mohammad Jaafari

Shiraz University of Medical Sciences

Research note

Keywords: motivation, academic performance, metacognition skills, learning, Academic Motivation Scale (AMS), Metacognitions Questionnaire-30 (MCQ-30)

Posted Date: January 16th, 2020

DOI: <https://doi.org/10.21203/rs.2.20995/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Objectives: the purpose of present study is investigation the impact of metacognitive strategies and motivation on academic performance of medical learners

Results: The findings showed that the mean scores of metacognitive strategies of participants and the success rate and academic performance of clinical students of the medical school were positively and significantly correlated ($r = .406, p = 0.001$). The results showed a positive and significant correlation between the metacognitive strategies (70.92 ± 6.1) and academic motivation (136.92 ± 23.9), respectively ($P = .001$ & $r = .24$). So, we can find the mediatory role of academic motivation in metacognitive strategies and academic performance

Keywords: motivation, academic performance, metacognition skills, learning, Academic Motivation Scale (AMS), Metacognitions Questionnaire-30 (MCQ-30)

Introduction:

Society and especially the higher education expect the person progresses and transcends as it should be, in various aspects including cognitive dimensions, acquiring skills and abilities as well as personality, emotional and behavioural dimensions(1). metacognitive strategies and study are known as important and determinant factors of academic advancement, in addition to intelligence and genius for success in university; so, students should be motivated to use these strategies(2). Metacognition is defined as individual knowledge of cognitive processes(3); which plays an important role in a variety of cognitive activities, including bandying verbal information, verbal encouragement, understanding and comprehension of read texts, writing, language learning, perception, attention, memory, problem solving, social recognition, various forms of self-learning and self-control(4).

Motivation also has a significant effect on academic advancement in addition to cognitive and metacognitive skills(5), which has been defined as the highest learning pathway(6), and it can be considered as a force generator and behavioural guidance that gives intensity and direction to individual effort(5). Motivation and learning are two integral parts in academic advancement(7). In numerous studies, the positive relationship between motivation and learning has been confirmed(8, 9). Based on the results of previous studies (10–14), it seems that familiarizing learners with cognitive and metacognitive strategies leads to create motivation and their academic advancement. Therefore, the present study evaluates the impact of metacognitive strategies and motivation on academic performance of medical learners.

Method:

This is a descriptive-analytic research that evaluates the relationship between metacognitive skills, academic motivation and academic performance of medical students.

Participants:

The statistical population of this research is all medical clinical students in 2017, which among 721 medical students, 254 (84 student, 83 extern and 87 interns) were selected randomly to participate in the study according to the Cochran formula. 119 male students and 135 female students participated in this study according to gender.

Data Gathering Tools:

Cartwright-Hatton & Wells metacognition questionnaires(15) and Vallerand academic motivation questionnaires(16) are the used tools in this research.

Statistical analysis:

SPSS version 18 was used to analyse the data. Independent statistical t-test, one-way variance analysis, Pearson correlation test, synchronous regression, multiple regression and descriptive statistics were used in this study. Multiple regression was used as a hierarchical process in accordance with Baron & Kenny 1986 steps(17).

Results:

Cronbach's Alpha coefficient of positive beliefs dimensions about worries was (0.71), negative beliefs about controllability (0.81), Cognitive confidence (0.76), need to control thoughts (0.78), Cognitive self-consciousness (0.77) and the total reliability of this questionnaire was .83. In this research, the whole reliability of Vallerand academic motivation questionnaire was obtained 0.87 by using Cronbach's alpha coefficient.

There is no significant difference between the success rate and academic performance among male and female students (p -value = 0.861). There is a significant difference between success and academic performance among degrees of clinical students. According to the obtained results (p -value- 0.355). There is a significant positive correlation between the metacognitive strategies variable and the dependent variable of academic performance and by increasing the score of the metacognitive strategies of students, their academic performance is also increases (Table 1).

Table 1

relation between the metacognition dimensions and academic performance 254 participant

Variables	Mean (SD)	Pearson Correlation	Sig.
Academic Performance	15 (1.21)	.406	.001
metacognitive strategies	70.92 (6.10)		
positive beliefs about worry	14.03 (1.58)	.147	.019
Negative beliefs about uncontrollability/danger	15.74 (2.49)	.271	.001
Cognitive confidence	11.81 (2.28)	.113	.072
need to control thoughts	13.36 (2.43)	.277	.001
Cognitive self-consciousness	15.96 (1.92)	.333	.001

The results of present study show that according to the correlation coefficient value, there is a positive and significant relationship between the motivation variable (136.28 ± 23.9) and the academic performance variable (15 ± 1.21) of students ($r = 0.734$, $p = 0.001$). In other words, by increasing the motivation of students, they will have a better academic performance. In addition, the results of this study confirmed a positive and significant correlation ($P = .001$ & $r = .24$) between metacognitive strategies (70.92 ± 6.1) and academic motivation (136.28 ± 23.9).

Based on the obtained findings of the evaluation of mediatory role of motivation between metacognitive strategies and academic performance of students ($R = 0.406$, $R^2 = 0.165$, $Adj.R = .162$, $t = 7.057$, Beta coefficient = $.406$, $P < 0.001$), it is found that the metacognitive strategies variable is a positive and significant predictor for the student's academic performance criterion variable.

The results of multiple regression in the synchronous manner ($R = 0.240$, $R^2 = 0.057$; $Adj.R = .054$, Beta coefficient = $.24$, $t = 3.917$ $p < 0.001$) indicate that the metacognitive strategies variable has a positive and meaningful predictive power for the student's academic motivation variable. Findings of Table 2 indicate that metacognitive strategies and academic motivation have positive and significant predictive power for students' academic performance variable.

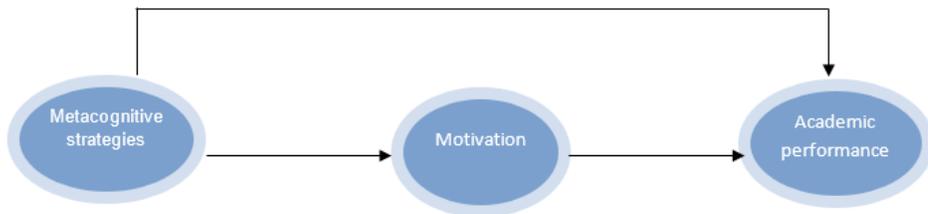
Table 2

determining predictive power of metacognition and motivation for academic performance

Academic Performance						
Predictive Variable	R	R ²	Adj.R	Beta	T	Sig.
Metacognition	.771 ^a	.594	.591	.245	5.907	.001
Motivation				.675	16.30	.001

The results of present study suggest that the reduction of regression coefficients of metacognitive strategies is 0.161 in stages one to three; through these results, we can find the mediatory role of academic motivation in metacognitive strategies and academic performance. In the third regression test, the results indicate that the regression of academic achievement is significant on cognitive strategies and academic motivation ($F = 183.9$; $P < 0.01$). Similarly, cognitive strategies and academic motivation explain 57.1 percent of the student's academic performance changes and led to the creation of Model No. 1.

Model 1: the relation of metacognitive strategies, motivation and academic performance



Metacognitive strategies	direct effect=.406 metacognition → academic performance
	indirect effect metacognition → educational motivation → academic performance (.675)(.245)=.165 Sum of direct and indirect effect=.571
educational motivation	Direct effect=.734 educational motivation → academic performance

Discussion:

The success of learners in learning environment is dependent on effective learning(18); the motivating factor is one of the most important factors affecting the quality and level of individuals learning(12, 19, 20). Therefore, the purpose of this study was to determine the impact of metacognitive strategies and motivation on academic performance of medical learners and the mediatory role of this educational motivation in the relationship between metacognitive strategies and academic performance of medical students in 2017.

In the present study, the highest and lowest correlations between dimensions of metacognitive questionnaire with academic performance were respectively related to cognitive self-conscious and Cognitive confidence; all aspects of metacognitive strategies had a positive and significant correlation with academic achievement and performance of students, except for Cognitive confidence dimension. In the study of Bright et al., the most correlation was the correlation between the need to control the thoughts and cognitive self-conscious and the correlation between need to control thoughts and negative beliefs about uncontrollability/danger(21).

Metacognition is rooted in the exact self-examination of the learning process by learners, to ensure deep, constructive, and results oriented learning(22). Therefore, successful learning requires that people integrate new information with previous knowledge structures(23). In this regard, the findings of this

study showed that the mean scores of metacognitive strategies of students and the degree of success and academic performance of clinical students of the faculty of medicine were positively and considerably correlated. This means that students who had higher metacognitive thinking about their performance and academic status, had better academic advancement and performance (24–27).

The learning motivation for learners includes positive attitudes related to academic achievement and plays an important role in guiding students' behaviour and effort in the learning situations of educational environments(28, 29). Therefore, the effect of academic motivation on academic performance and academic advancement of students, as well as the relationship between this variable and metacognitive strategies were evaluated in this study. The results of this study showed that there is a positive correlation between the motivation variable and the academic performance of the medical students of the faculty of medicine (30–32). Therefore, based on the results of present study, students who had a higher level of metacognitive awareness of their own planning, monitoring, and rethinking of their thoughts, had more motivation to perform their activities, including their educational performance. Clearly, motivation is a feature that not only improves academic advancement but also promotes the progress and excellence of all affairs and facets of life(7).

Conclusion:

Professors and students learn how to use cognitive and metacognitive strategies and use them in combination to learn. Also, due to the positive impact of metacognitive strategies training on metacognitive knowledge and academic performance of students, it is recommended that metacognitive-based curriculum be developed to promote the development of metacognitive knowledge and academic performance and thus the possibility of increasing the academic advancement among these students.

Limitation:

The limitation of the present study is that the study was conducted only on medical students that may not be a good representative of the whole health care students.

Declarations

Acknowledgment:

This study was obtained from a thesis for obtaining Medical Degree by first author, with proposal number 15866 approved by the Deputy of Research of Shiraz University of Medical Sciences. The authors thank all the medical students who participated in this study.

Authors' contributions:

MA, M.E and SD contributed the commencement of the study, coordination, participated in the collection of data and drafted the manuscript. M.E, S.M and M.J participated in data collection and analysis. M.A and S.D participated in the drafting of the manuscript. All authors read and approved the final manuscript.

Availability of data and materials:

Not applicable.

Competing interests:

The authors declare that they have no competing interests.

Consent for publication:

Written informed consent was obtained from the students for publication of this research note.

Ethics approval and consent to participate:

This study was approved by the Ethics committee of Shiraz University of Medical Sciences. Informed written consent to participate was obtained from all participants. Participants participated in the study voluntarily and their names were not mentioned in the scripts.

Funding:

All of the funds of the present study were provided by the vice chancellor of research at Shiraz University of Medical Sciences

References

1. Raeisoon M, Mohammadi Y, Abdorazaghnejad M, Sharifzadeh G. An investigation of the relationship between self-concept, self-esteem, and academic achievement of students in the nursing-midwifery faculty in Qaen during 2012-13 academic year. *Modern Care Journal*. 2014;11(3):236-42.
2. Credé M, Phillips LA. A meta-analytic review of the Motivated Strategies for Learning Questionnaire. *Learning and individual differences*. 2011;21(4):337-46.
3. Flavell JH, Flavell ER. Development of children's intuitions about thought-action relations. *Journal of cognition and development*. 2004;5(4):451-60.
4. Flavell JH, Miller PH, Miller SA. *Cognitive development: Prentice-Hall Englewood Cliffs, NJ; 1985.*

5. Kruglanski AW, Fishbach A, Woolley K, Bélanger JJ, Chernikova M, Molinario E, et al. A structural model of intrinsic motivation: On the psychology of means-ends fusion. *Psychological review*. 2018;125(2):165.
6. McEwan L, Goldenberg D. Achievement motivation, anxiety and academic success in first year Master of Nursing students. *Nurse education today*. 1999;19(5):419-30.
7. Wlodkowski RJ, Ginsberg MB. *Enhancing adult motivation to learn: A comprehensive guide for teaching all adults*: John Wiley & Sons; 2017.
8. Su CH, Cheng CH. A mobile gamification learning system for improving the learning motivation and achievements. *Journal of Computer Assisted Learning*. 2015;31(3):268-86.
9. Kiemer K, Gröschner A, Pehmer A-K, Seidel T. Effects of a classroom discourse intervention on teachers' practice and students' motivation to learn mathematics and science. *Learning and instruction*. 2015;35:94-103.
10. Van Staden L, Ellis S. Some variables influencing academic achievement: reading, motivation, learning strategies, learning approaches. *Journal of Educational Studies*. 2017;16(2):113-31.
11. Everaert P, Opdecam E, Maussen S. The relationship between motivation, learning approaches, academic performance and time spent. *Accounting Education*. 2017;26(1):78-107.
12. Ilyas I, Liu ANAMm. Relation of Achievement Motivation and Learning Motivation with Learning Outcomes of Physics Students in Universitas Flores. *Kasuari: Physics Education Journal (KPEJ)*. 2018;1(1):52-5.
13. Chik Z, Abdullah AH. Effect of Motivation, Learning Style and Discipline Learn about Academic Achievement Additional Mathematics. 2018.
14. Brunner M, Keller U, Wenger M, Fischbach A, Lüdtke O. Between-School Variation in Students' Achievement, Motivation, Affect, and Learning Strategies: Results from 81 Countries for Planning Group-Randomized Trials in Education. *Journal of Research on Educational Effectiveness*. 2018;11(3):452-78.
15. Wells A, Cartwright-Hatton S. A short form of the metacognitions questionnaire: properties of the MCQ-30. *Behav Res Ther*. 2004;42(4):385-96.
16. Vallerand RJ, Pelletier LG, Blais MR, Briere NM, Senecal C, Vallieres EF. The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educ Psychol Meas*. 1992;52(4):1003-17.
17. Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*. 1986;51(6):1173.
18. Kashfi SM, Yazdankhah M, Sedaghat Z, Hajipour A. Educational Motivation and Some Related Factors in Students of Health and Nutrition School in Shiraz University of Medical Sciences. *Development Strategies in Medical Education*. 2017;4(2):50-9.
19. Hidi S. Revisiting the role of rewards in motivation and learning: Implications of neuroscientific research. *Educational Psychology Review*. 2016;28(1):61-93.

20. Cho M-H, Heron ML. Self-regulated learning: the role of motivation, emotion, and use of learning strategies in students' learning experiences in a self-paced online mathematics course. *Distance Education*. 2015;36(1):80-99.
21. Bright M, Parker S, French P, Morrison AP, Tully S, Stewart SL, et al. Assessment of metacognitive beliefs in an at risk mental state for psychosis: A validation study of the Metacognitions Questionnaire-30. *Clinical psychology & psychotherapy*. 2018.
22. Yusuff KB. Does self-reflection and peer-assessment improve Saudi pharmacy students' academic performance and metacognitive skills? *Saudi Pharmaceutical Journal*. 2015;23(3):266-75.
23. Smallwood J, Fishman DJ, Schooler JW. Counting the cost of an absent mind: Mind wandering as an underrecognized influence on educational performance. *Psychonomic bulletin & review*. 2007;14(2):230-6.
24. Coutinho S. Self-efficacy, metacognition, and performance. *North American Journal of Psychology*. 2008;10(1).
25. Romainville M. Awareness of cognitive strategies: The relationship between university students' metacognition and their performance. *Studies in Higher Education*. 1994;19(3):359-66.
26. Coutinho SA. The relationship between goals, metacognition, and academic success. *Educate*. 2007;7(1):39-47.
27. Javanmard A, Hoshmandja M, Ahmadzade L. Investigating the relationship between self-efficacy, cognitive and metacognitive strategies, and academic self-handicapping with academic achievement in male high school students in the tribes of Fars Province. *Journal of life Science and Biomedicine*. 2012;3(1):27-34.
28. Viljaranta J, Aunola K, Hirvonen R. Motivation and academic performance among first-graders: A person-oriented approach. *Learning and individual differences*. 2016;49:366-72.
29. Sohrabi Z, Koohestani HR, Baghcheghi N, Delavari S, Shahsavarloo ZR. The effects of group blogging on the attitude towards virtual education in nursing students. *Medical journal of the Islamic Republic of Iran*. 2017;31:132.
30. Prasad JJ, Showler MB, Ryan AM, Schmitt N, Nye CD. When belief precedes being: How attitudes and motivation before matriculation lead to fit and academic performance. *Journal of Vocational Behavior*. 2017;100:27-42.
31. Suárez-Álvarez J, Fernández-Alonso R, Muñiz J. Self-concept, motivation, expectations, and socioeconomic level as predictors of academic performance in mathematics. *Learning and individual differences*. 2014;30:118-23.
32. Spada MM, Moneta GB. Metacognitive and motivational predictors of surface approach to studying and academic examination performance. *Educational Psychology*. 2014;34(4):512-23.