

## Original Article

# The Correlation between Critical Thinking Disposition and Academic Achievement of Preclinical and Clinical Medical Students at Kermanshah University of Medical Sciences

Vida Sepahi M.Sc<sup>1</sup>, Mohammad Rasool Khazaei M.D.<sup>2\*</sup>, Ahmad Khoshay M.Sc<sup>3</sup>, Shirin Iranfar Ph.D<sup>4</sup>, Mehnoush Timare M.Sc<sup>3</sup>

1. *Ph.D Student of Higher Education Management, Allameh Tabatabaee University, College of Graduate Studies Authority, Tehran, Iran.*

2. *Fertility and Infertility Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran.*

3. *Department of Nursing, School of Nursing and Midwifery, Kermanshah University of Medical Sciences, Kermanshah, Iran.*

4. *Education Development Center, Kermanshah University of Medical Sciences, Kermanshah, Iran.*

\* *Address for Correspondence. School of Medicine. University St, Shahid Shiroudi Blvd, Iran. Zip-code, 67148-69914; Tel (Fax). +988314281563; Email. mrkhazaei@kums.ac.ir*

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## Abstract

**Introduction:** Critical thinking skill is an essential factor for success in today's rapidly developing world. The present study was carried out to compare the association between critical thinking disposition and academic achievement in preclinical and clinical medical students.

**Methods:** This study was descriptive-correlational in which the sample included 259 medical students at Kermanshah University of Medical Sciences selected through stratified random sampling. The standard critical thinking disposition inventory (with validity of 0.8 and the students' report card grades as criterion for academic achievement) was used to collect the data. Data were analyzed by SPSS 16 software using descriptive statistics, t-test, and Kolmogrov-Smirnov and correlation coefficient tests.

**Results:** The mean of critical thinking disposition in the preclinical stage was  $209.08 \pm 26.24$  indicating a significant correlation with academic achievement ( $p=0.003$ ,  $r=-2.64$ ). In the clinical stage, however, the mean of critical thinking disposition was  $214.07 \pm 28.15$  which showed no significant correlation with academic achievement. Moreover, the mean of critical thinking disposition and its components in preclinical and clinical stages revealed not significant correlation and merely curiosity component showed a significant correlation ( $p=0.04$ ).

**Conclusion:** The results of the present study showed no correlation between critical thinking disposition and academic achievement in the clinical stage; however, this correlation was negatively significant in the preclinical stage.

**Keywords:** Critical thinking, Medical students, Academic achievement

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## Introduction

Nowadays, the major concern is not to have access to information, but to provide an environment in which individuals can not only learn the content but also learn how to learn. Hence, the focus of education has shifted toward promotion of Critical Thinking (CT) and empowerment of lifelong education (1). CT is a kind of exclusively purposeful thinking in which the thinker systematically establishes tactful standards for thinking, accepts the responsibility of the thinking structure, directs it according to the standards and evaluates the efficiency of thinking based on the standards (2).

In the contemporary world, healthcare is facing rapid changes and astonishing increase of knowledge and CT is necessary for medical jobs in order to make clinical judgments in cases where clinical problems need to be resolved (3). CT is an integral part of clinical decision-making and professional competence. Suppressing the independence and thinking power, anxiety in exposure to unfamiliar situations, increasing errors of the treatment group and adverse risks in society are the negative consequences of lack of CT (4). Using CT is highly valuable in clinical situations, so that clinical decision-making requires practical clinical knowledge, data collection skills and strategy-allocation knowledge to effectively solve the patient's problem (5). The education system of Medical Sciences in the country is currently encountering many challenges to fulfill the expectations of the society in terms of health promotion. Thus, it is necessary to train efficient, creative, and thoughtful graduates with appropriate decision-making based on the regional, national and international standards (6).

CT includes two aspects of Critical Thinking Skills (CTS) and Critical Thinking Disposition (CTD). The CTS dimension emphasizes cognitive strategies and CTD focuses on attitudinal components of thinking and intrinsic motivation to solve the problems. CTS are considered as cognitive skills. In fact, without positive disposition to CT (emotional dimension) this kind of thinking does not occur or appears below the standard level; therefore, CTD is considered as an integral part of CT (7).

Previous research has indicated that, despite the importance of CT as a basic tool for learning, the students are generally less able to use CTS (8). Some studies have shown that the CT score of the students is positively associated with their academic achievement; whereas, some other studies have not reported significant correlation and have suggested further studies to be conducted in this regard (9, 10).

Identifying the reasons of lack of academic achievement and adopting preventive strategies can effectively reduce the academic failure and consequently improve the physical, psychological and educational status of the students. The issue of academic achievement and failure is regarded more important when we realize that most of the students possess the required capabilities to achieve success but they cannot succeed (11). In medicine too, attention to the factors affecting the students' learning and academic achievement can promote their performance. This study was an attempt to show the development of students' cognitive activities. The results of the present study can reinforce and remove the weak-points in CT education, in the one hand; and can draw the teachers and managers' attention to the significance of CT assessment in medical students, on the other hand. To this end, the present study was conducted to determine the correlation between CTD and academic achievement of preclinical and clinical medical students at Kermanshah University of Medical Sciences (KUMS).

## Methods

This study was a descriptive-correlation study in which the statistical society included 795 (based on the obtained statistics) medical students at KUMS. Based on the population size, the study sample was calculated as 259 students according to the previous study (4) with 95% confidence and 5% accuracy. The inclusion criteria for the participants consisted of: lack of stress and fatigue (e.g. not having university exams or crash courses and shifts during internship), non-participation in similar studies and lack of prior familiarity with the questionnaire. The exclusion criteria included unwillingness to participate in the study and psychological-environmental stress that affected responding. In this study, the preclinical (basic sciences and physiopathology) and clinical (apprenticeship and internship) students at KUMS were selected through stratified sampling. Prior to administration of the questionnaire, the students were required to sign the consent forms, and the objectives of the study, the responding manner and the time to complete the questionnaire were explained and confidentiality of the data was emphasized.

The instrument for data collection was California Critical Thinking Disposition Inventory (CCTDI). This questionnaire consists of 75 questions rated based on Likert Scale from 1-6 (completely agree-completely disagree). The questions include seven scope of truth-seeking, open-mindedness, inclination to analyze, systematize, self-confidence, cognitive maturity and inquisitiveness. The minimum score in this test is 70 and the maximum score

is 420, and the minimum and maximum scores in each scope of CTD are 10 and 60, respectively.

A score lower than 210 indicates negative CTD, between 210 and 280 shows ambivalent CTD and higher than 280 indicates positive CTD. For the scopes of CTD, the scores <30, 30-40 and >40 indicate negative, ambivalent and positive CTD, respectively (12). The validity of the abovementioned questionnaire has been confirmed by the American Philosophical Association (APA) using Delphi strategy and the reliability of the questionnaire ( $r=0.9$ ) has been calculated by Cronbach's alpha coefficient (13). Moreover, the questionnaire has been translated into Persian with the reliability of 0.8 determined by Cronbach's alpha coefficient. The validity of the questionnaire has also been confirmed and the scores of

0.7, 0.6, 0.56, 0.55, 0.5, 0.43 and 0.41 have been obtained for the scopes of self-confidence, systematization, truth-seeking, ability to analyze, inquisitiveness, cognitive maturity and open-mindedness, respectively (14).

Another variable in this study was students' academic achievement which was obtained based on the grade point average of the previous semesters and the number of probationary semesters via  $Y=M1-1/2M2$  equation, where M1 is the grade point average of the previous semesters and M2 is the number of probationary semesters in previous semesters. Data were analyzed by SPSS 16 software using descriptive (frequency, mean and standard deviation) and inferential (correlation coefficient and independent sample t-test) statistics.

**Table 1. Distribution of total scores CTD and its scopes**

Critical Thinking Disposition	Positive (more than 40) n(%)	Ambivalent (30-40) n(%)	Weak (less than 30) n(%)
Total CTD	3(1.2)	132(51)	124(47.9)
Truth-seeking	52(20.1)	148(57.1)	59(22.8)
Open-mindedness	15(5.8)	142(54.8)	102(39.4)
Inclination to analyze	12(4.6)	45(17.4)	202(78)
Systematize	18(6.9)	123(47.5)	118(45.6)
Self-confidence	16(6.2)	50(19.3)	193(74.5)
Cognitive maturity	15(5.8)	97(37.5)	147(56.8)
Inquisitiveness	15(5.8)	106(40.9)	138(53.3)

## Results

From 259 participants, 55.2% were girls and 88% were married. The mean age of the participants was  $22.92\pm 2.59$ , the minimum age was 18 and the maximum

age was 49. 49% of the students were studying the preclinical courses and the rest were studying the clinical courses.

**Table 2. Results of correlation coefficient about CTD and academic achievement and its scopes.**

Critical Thinking Disposition	N	MD $\pm$ SD	r	P value	
Total CTD	Preclinical	127	209.08 $\pm$ 26.24	-2.64	0.003
	Clinical	132	214.07 $\pm$ 28.15	0.016	0.132
truth-seeking	Preclinical	127	35.07 $\pm$ 5.66	0.044	0.619
	Clinical	132	35.44 $\pm$ 7.71	-0.033	0.707
open-mindedness	Preclinical	127	31.13 $\pm$ 4.84	-0.075	0.405
	Clinical	132	32.71 $\pm$ 4.54	-0.090	0.306
inclination to analyze	Preclinical	127	25.98 $\pm$ 5.85	-0.162	0.069
	Clinical	132	27.28 $\pm$ 7.15	0.086	0.132
systematize	Preclinical	127	31.46 $\pm$ 6.75	-0.314	<0.001
	Clinical	132	30.39 $\pm$ 6.94	-0.051	0.652
self-confidence	Preclinical	127	26.09 $\pm$ 7.06	-0.207	0.020
	Clinical	132	27.20 $\pm$ 8.72	0.31	0.752
cognitive maturity	Preclinical	127	29.92 $\pm$ 5.96	-0.77	0.003
	Clinical	132	30.46 $\pm$ 6.72	-0.013	0.299
inquisitiveness	Preclinical	127	29.40 $\pm$ 6.92	-0.264	0.387
	Clinical	132	30.46 $\pm$ 7.30	0.091	0.881

The results of independent t-test indicated no significant correlation between gender and CTD ( $p=0.3$  and  $t=0.224$ ), and 47.9% and 1.2% of the samples had negative CTD and positive CTD, respectively (Table 1). The means of CTD and academic achievement were  $211.62\pm 1.69$  and  $14.91\pm 0.10$ , respectively. Further, the findings showed a reverse significant correlation between CT and academic achievement in preclinical students; however, this

correlation was not significant in the case of clinical students (Table 2). The means for clinical thinking disposition in preclinical and clinical stages were  $209.08\pm 26.24$  and  $214.07\pm 28.15$ , respectively, which indicated no significant difference. In the case of CTD scopes, however, the difference between the means of inquisitiveness scope in both preclinical and clinical stages was significant ( $p=0.049$ ) (Table 3).

**Table 3. Distribution of mean and standard deviation of total scores CTD and its scopes based on the levels of education.**

Critical Thinking Disposition		MD±SD	t	P value
Total CTD	Preclinical	209.08±26.24	-1.474	0.823
	Clinical	214.07±28.15		
truth-seeking	Preclinical	35.07±5.66	-0.446	0.834
	Clinical	35.44±7.71		
open-mindedness	Preclinical	31.13±4.84	-2.718	0.524
	Clinical	32.71±4.54		
inclination to analyze	Preclinical	25.98±5.85	-1.592	0.750
	Clinical	27.28±7.15		
systematize	Preclinical	31.46±6.75	1.257	0.217
	Clinical	30.39±6.94		
self-confidence	Preclinical	26.09±7.06	-1.123	0.920
	Clinical	27.20±8.72		
cognitive maturity	Preclinical	29.92±5.96	-0.674	0.656
	Clinical	30.46±6.72		
inquisitiveness	Preclinical	29.40±6.92	-1.309	0.049
	Clinical	30.46±7.30		

## Discussion

The findings of the presents study showed low CTD level for preclinical and clinical students. Although the mean of the obtained scores in clinical stage was higher than that of the preclinical stage, no significant correlation was reported between CTD and its scopes except inquisitiveness disposition in both groups. However, it is expected that students indicate higher levels of CTD and make more use of CTS by gaining experience and promoting to higher academic levels. The highest mean was reported for truth-seeking scope in clinical stage, which is a basic CTD. In this scope the individuals with this disposition are brave enough to raise questions and discuss different issues. This class of people is looking for right information and knowledge even if it is against their previous beliefs (3). The minimum mean was reported for analysis disposition in preclinical stage. The low level of this scope is indicative of the inability of these people to smartly solve the problems. This seems to be the result of teaching method which is still run traditionally in most of the universities in the country.

Various studies have been carried out in different universities in this regard. Amini (2010) reported a statistically significant difference between the total score

of CT and academic level of the students; however, interns acted significantly better than the other two groups in the inference scope (15). With regard to the findings of Shafiei (2004), Ranjbar (2006), Zarghi (2000), Mirmolaei (2004) and Abdhagh (2004), no significant difference was observed between the CT scores of freshmen and seniors (16, 20). Also, MacGrath concluded that the mean score of CTS of students increased in the first, second and fourth years, but not in the third year, but this increase was not significant (21). However, Gharib (2009) conducted a study on master students and concluded that the score pattern of CTD in the freshmen was significantly different than the seniors and the score of the senior students was higher than the freshmen (7). The findings of Babamohammadi (2004) study carried out on nursing students are not in line with the results of the present study (22).

The results of the present study showed no correlation between CTD and academic achievement in clinical studies; whereas, this correlation was negatively significant in preclinical studies; that is, the students' CTD decreased when students' academic achievement increased. In fact, this correlation was not significant in the case of truth-seeking, open-mindedness and analysis disposition scopes. It seems that in the medical department memorizing and studying voluminous books

are more emphasized than fostering CT in students. The findings of these studies clarify the necessity of fostering thinking potential in students. Furthermore, the results of the present study are in line with the findings of Shafiei (2005), Athari (2009), and Bahmani (2005) (16, 23, 24).

The studies carried out in the scope of education have revealed that, based on CTS, the annual grade point average (Behrens, 1996; Taube, 1997), scores of courses (Wilson & Wanger, 1981), academic achievement and success of students and graduates (Garett & Wulf, 1978; Alivandi Vafa, 2006) can be predicted (25-29). Moreover, Redding (2001) reported a significant relationship between the mean of scores in nursing education and CTD of nursing students (30).

To develop critical thinking, the role of educational centers as information repository and teachers as lecturer and information conveyors needs to be changed and students have to enhance their thinking and reasoning skills and process and apply the acquired information instead of saving it. Expert use of CT would enable the students to progress, gain higher scores in the examinations and comprehend the materials with higher depth, longer retention and even higher efficiency. To teach CT to students, it is necessary to create a state of interaction between students and teachers as well as an organized framework for thinking processes and to make use of skills and situations employed in this process. The results of the present study indicated no significant correlation between gender and CTD. In line with this finding, Jeremy, Shany and Nachmias reported that gender had no effect on CTD level (31, 32).

## Conclusion

The students' scores of CTD and its scopes were not favorable and their academic status was not correlated with these dispositions. To teach CT to students, it is necessary to build a sense of interaction between students and teachers, to create an organized framework for thinking processes and to use skills and situations used in this process.

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## References

- Garrison .D .R and Anderson .T. E(2004). Learning in the 21<sup>st</sup> Century. London: Rutledge Flamer
- Broadbear James T, Keyser Bette B. An approach to teaching for critical thinking in health education. The Journal of School health. 2000; 70(8): 322-326.
- Iranfar Sh, Sepahi V, Khoshay A, Rezaei M, Karami Matin B, Keshavarzi F et al. Critical thinking disposition among medical students of Kermanshah University of Medical Sciences. Edu R Med S. 2012; 1(2): 17-22.
- Barkhordary M, Jalalmanesh S, Mahmodi M. The Relationship between critical thinking disposition and self esteem in third and fourth year bachelor nursing students. IJME. 2009; 9(1):13-19. [Persian]
- Myrick F, Young O. Preceptor questioning and student critical thinking; Journal of professional nursing 2002; 18(3): 176-181.
- Hasanpour M, Mohammadi R, Dabbaghi F, Oskouie F, Yadavar Nikraves M, Salsali M, Nooritajer M. The need for change in medical sciences education: A step towards developing critical thinking. IJN. 2006;18(44): 39-49. [Persian]
- Gharib M, Rabieian M, Salsali M, Hadjizadeh E, Sabouri Kashani A, Khalkhali H. Critical Thinking Skills and Critical Thinking Dispositions in Freshmen and Senior Students of Health Care Management. IJME. 2009; 9(2):125-35. [Persian]
- Martin L, Thompson SD, Richards L. Online scenarios in FCS college courses: Enhancing critical thinking skills. Journal of Family and Consumer Sciences. 2008; 100(2): 25-30.
- Bakhshi M, Ahanchian M. A Proposed Model to Predict Academic Achievement: The Role of Critical Thinking and Self-regulated Learning Strategies. IJME. 2013; 13(2): 153-163. [Persian]
- Aghaei N, Souri R, Ghanbari S, Comparison of the relationship between critical thinking and academic achievement among physical education students and students in other fields of study in Bu Ali Sina University, Hamedan. 2012; 2(4): 35-45. [Persian]
- Biabangard A. Preventing academic failure. 1st ed. Tehran: Olia and morabian Council publication; 2002. [Persian]

12. Facione P, Fatcione N, The disposition toward critical thinking. *Journal of General Education*. 1995; 144: 25-40.
13. American Philosophical Association. (1990).Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction. The Delphi Report Executive Summary: Research findings and recommendations prepared for the committee on pre-college philosophy. (ERIC Document Reproduction ServiceNo. ED315423)
14. Gupta K, Iranfar Sh, Iranfar Kh, Mehraban B, Montazeri N. Validity and Reliability of California Critical Thinking Disposition Inventory in Kermanshah University of Medical Sciences. *Educ Res Med Sci*. 2012; 1(1): 6-10.
15. Amini M, Fazlinejad N. Evaluation of medical students' critical thinking skills. *Journal of Hormozgan University of Medical Sciences*. 2001; 14(3): 213-218. [Persian]
16. Shafiei Sh, Khalili H, Mesgharaf H. Evaluation of critical thinking skills in nursing students of Nursing and Midwifery, Zahedan. 2005; 53: 20-24. [Persian]
17. Ranjbar H, Esmaili H. A study on the Nursing and Midwifery Students' Trend to Critical Thinking and its Relation with their Educational Status. 2006; 4(1): 11-20. [Persian]
18. Zarghi N. Comparison of different years of undergraduate nursing critical thinking [Dissertation]. Ghilan: Ghilan University of Medical Sciences; 2006. [Persian]
19. Mirmolaei T, Shabani H, Babaei G, Abdehagh Z. Comparison of critical thinking among first and last trimester baccalaureate midwifery students. *Hayat*. 2004; 10 (3): 69-77. [Persian]
20. Abdhagh Z. Compare freshmen and senior undergraduate students' critical thinking and continuous Midwifery. [Dissertation]. Tehran: Tehran University of Medical Sciences; 2005. [Persian]
21. McGrath GP. He relationship of critical thinking skills and critical thinking skills and critical thinking disposition of baccalaureate nursing students; *Journal of advanced nursing* 2003; 43(6): 569-577.
22. Babamohammadi H, Khalili H. Critical Thinking Skills of Nursing Students in Semnan University of Medical Sciences. *Iranian Journal of Medical Education*. 2004; 4 (2): 23-31. [Persian]
23. Athari Z, Sharif M, Nematbakhsh M, Babamohammadi H. Evaluation of Critical Thinking Skills in Isfahan University of Medical Sciences' Students and Its Relationship with Their Rank in University Entrance Exam Rank. *IJME*. 2009; 9 (1): 5-12. [Persian]
24. Bahmani F, Yousefy A, Nematbakhsh M, Changiz T, Mardani M. Critical thinking skills of basic sciences' students of medical university in facing scientific texts . *IJME*. 2005; 5 (2): 41-46. [Persian]
25. Behrens PJ. The watson-glaser critical thinking appraisal and academic performance of diploma school students, *Journal of Nursing Education*. 1996; 35: 34-36.
26. Taube. KT. Critical thinking ability and disposition as factors of performance on a written critical thinking test. *Journal of General Education*. 1997; 46: 129-164.
27. Wilson D G, Wagner E. The watson-glaser critical thinking appraisal as a predictor of performance in a critical thinking course. *Educational and Psychological Measurement*. 1981; 41:1319-1322.
28. Garrett. K . and Wulf. K . The relationship of a measure of critical thinking ability to personality variables and to indicators of academic achievement.*Educational and Psychological Measurement*. 1978.; 38: 1181-1187.
29. Alivandi Vafa M. relationship between critical thinking and academic achievement of students of Tabriz University [Dissertation]. Tabriz: School of Education and Psychology; 2006. [Persian]
30. Redding DA. Critical thinking disposition as it relates to academic achievement in baccalaureate nursing education. *Nurse Educator*. 2001; 26(3) 125-127.
31. Nicol Ann G. Assessment of critical thinking skills among undergraduate athletic training student [Dissertation]. North Akota: North Dakota state University; 2008.
32. Shany N, Nachmias R. The relationship between performance in VIRTUAL course and thinking styles, Genser, and ICT experience. *ORTMoshinsky: Research and Development Center*; 2000.