



Emotional Intelligence: A Comparison between Medical and Non-Medical Students

*Ibrahim ABDOLLAHPOUR^{1,2}, *Saharnaz NEDJAT^{2,3}, Mohammad Ali BESHARAT⁴,
Bayan HOSSEINI², Yahya SALIMI⁵*

1. School of Public Health, Arak University of Medical Sciences, Arak, Iran

2. Dept. of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran

3. Knowledge Utilization Research Center, Tehran University of Medical Sciences, Tehran, Iran

4. Dept. of Psychology, University of Tehran, Tehran, Iran

5. Dept. of Epidemiology and Biostatistics, School of Public Health, Kermanshah University of Medical Sciences, Kermanshah, Iran

***Corresponding Author:** Email: nejatsan@tums.ac.ir

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Abstract

Background: Emotional intelligence (EI) has recently been considered as one of the necessary elements for success and achievement in medical fields. The present study was conducted in Iran to compare the EI in medical and non-medical students adjusted for the other relevant factors.

Methods: This cross-sectional study was conducted from October 2011 to January 2012 on 872 students of medicine, paramedical and non-medical groups in Tehran University and Tehran University of Medical Sciences, Tehran, Iran selected by multi-stage weighted cluster sampling. The Farsi version of revised Schutte Emotional Intelligence (FEIS) was used to estimate emotional intelligence.

Results: The mean of total EI was equal to 124.9 (SD=8.4) out of 205 and the means for its dimensions were as follows: regulation of emotions 39.3 (SD=5.1), utilization of emotions 26.7 (SD=3.6) and appraisal of emotions 33.5 (SD=5.3). While the paramedical and non-medical students' total EI score was significantly higher than the medical students', in the utilization of emotions dimension, the medical students scored significantly higher than the other two groups.

Conclusions: The lower levels of the medical students' total EI score in comparison with paramedical and non-medical students in this study demands the relevant authorities to pay even more attention to the selection and training of medical students.

Keywords: Emotional management, Emotional intelligence, Academic achievement, Medical education

Introduction

In recent years, emotional intelligence (EI) has emerged as one of the vital elements of success and interpersonal relations in everyday life (1). This construct has been defined as "the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions" (2, 3). Accordingly, not only are people with high EI aware of their own emotions, but they are also

able to have a good understanding of others' emotions and use this ability to manage and adjust their behavior when communicating with others (4).

On the other hand, EI can affect the health of individuals, (5) therefore proving to be positively associated with self-rated physical and mental health (2, 6-8). Moreover, EI has effect on intellectual and emotional evolution and can affect

the educational achievement and occupational aspects of life (9). EI, in addition to forming behaviors and actions, can also positively affect learning (3, 10) and problem solving (3, 4).

Existing evidences demonstrate an increasing attention to EI as a necessary criterion for the admission of students in educational fields including medicine. The value of characteristics such as empathy, communication and interpersonal skills in medicine has been considered the same as cognitive intelligence (11). Emotions, as a valuable source of information, can be used to solve educational problems. Therefore, EI as a predictor of success has become the central focus of medical education (3). Therefore, while some issues such as emotional maturity, self-identification and personal health are vital to success in the medical field, EI has also become increasingly important (12). On the other hand, individuals with limited emotional skills may experience more stress and emotional problems during their academic yr. Meanwhile lower levels of EI in students can also lead to appearance of behavioral problems such as disruptive behavior disorders (1).

There are a number of hypotheses regarding the difference in EI between medical and non-medical students (13, 14). Nonetheless, to our best knowledge, not enough evidence exists to prove these hypotheses. Moreover, in spite of its importance, little attention has been paid to the adjusted association between EI and its predictors, and studies focused on this issue are still inadequate. Meanwhile, regarding the improvable nature of the EI, (15, 16) identification of its modifiable associated predictors can help design effective interventions in order to promoting students' EI.

Therefore, this study has been conducted to estimate mean of EI and its domains their adjusted association with some potential predictors in the medical and nonmedical students in Iran.

Material and Methods

Participants

Nine hundred and thirty students of Tehran University and Tehran University of Medical Sciences were invited to participate in this cross-sectional

study from October 2011 to January 2012. The reference population consisted of three groups of medical, paramedical and non-medical students with the exception of postgraduate students (PhD and MA). We used multi stage cluster sampling as our sampling strategy. For this, we defined our sampling frame as following: In the first stage, the faculties were defined as our primary sampling units. Then, departments were selected as secondary sampling units. Finally, the different fields in each of departments were defined as tertiary (main) units. Tertiary units were sampled proportional to size of faculties. After clarifying the study goals, whole of students in each of the main units were requested to participate in the study. Therefore, the sampling strategy and excellent response rate (94%) had minimized the chance of any selection bias.

Data collection tools

The Farsi version of the EI Scale-41 (FEIS-41); The Farsi version of revised Schutte emotional intelligence (FEIS-41) (17) was used to measure EI. There are two different EI constructs based on the method of measurement used to operationalize them; trait EI and ability EI (1, 18, 19). The FEIS-41 measured the trait EI. The reliability and validity of the EIS questionnaires (33 and 41 items) were confirmed in other studies and are comparable with those of the 133 item Bar-On EQ-i questionnaire (20). The Likert scale was used in this questionnaire and the responses ranged from strongly disagree (score=1) to strongly agree (score=5). Reliability and validity of the Farsi version of this questionnaire (FEIS-41) have been evaluated and approved (17). FEIS-41 measures the three dimensions of EI: regulation of emotions (RoE), utilization of emotions (UoE) and appraisal of emotions (AoE) (17). The attainable scores is 10 to 50 for RoE, 7 to 35 for UoE and 9 to 45 for AoE, while the total EI score ranged from 41 to 205. Regulation of emotions (optimism / mood regulation) measures the extent to which people report being able to regulate their emotions in themselves and others. Utilization of emotions (optimism / positivity) measures the extent to which people report being able to utilize their emotions in solving problems. Finally, appraisal of emotions measures the extent to which

people report being able to identify their own and others' emotions.

The socio-demographic and academic status questionnaire

The socio-demographic questionnaire contained the following items: age, gender, marital status (single, married, divorced, widowed) paternal family size, accommodation (dormitory, private house, paternal house), constructed area per capita of the paternal house (as a proxy of economic status, for calculating this indicator the paternal household level infrastructure was divided by the number of family members.), yr of admission to university and educational group (medical, paramedical, non-medical).

Moreover, the participants overall quality of life was measured using a five-point Likert scale ranging from very satisfied to very dissatisfied [0-4]. It was shown that the single-item quality of life could be used for evaluating quality of life, which is comparable with other multi-dimension quality of life questionnaires (21).

Statistical analysis

After meeting the assumptions of the parametric tests in this study, it became possible to use tests such as the *t*-test, analysis of variance (ANOVA) and correlation to determine the association of mentioned variables with EI and its dimensions in bivariate analysis. Four multiple linear regression models, considering the establishment of the required assumptions, were also applied to determine the adjusted association of relevant covariates. Multiple linear regression models provide the possibility of assessing the association between each of the measured variables after controlling for the effect of the other variables (confounders) with the EI. For fitting the final regression models we enter only variables which, in the bivariate analysis, the *P* value of their association with EI or its dimensions was lower than 0.2 (22). The backward method was applied in order to fit the final models. The following were entered into the model as dummy variables: educational group, marital status, yr of entrance into the university and accommodation. The base-

line level for these variables were 'medical', 'married', 'first yr' and 'dormitory' respectively.

Results

Eight hundred and seventy two out of 930 students completed the self-administered questionnaires (response rate = 94%). Due to incomplete responses to the questions of RoE, UoE and AoE dimensions, it was not possible to calculate the mentioned dimension scores for 35, 46 and 62 of the participants in each dimension respectively. Therefore, we could not calculate overall EI score for 151 of the students. Table 1 shows the characteristics of participants along with the summarized information of the main variables. Accordingly, 604 students (69%) were females. In addition, 285 students (32.7%) were medical students, 267 (30.6%) were paramedical students and 318 (36.5%) were non-medical students. The following mean values were obtained from the continuous covariates: age 20.3 (SD = 0.08), constructed area per capita (as the proxy of socioeconomic status) 41.89 square meters (SD = 5.85), successfully passed academic yr 13.4 yr (SD = 0.044), GPA of previous semester 16.5 (SD = 1.7), total EI score 124.9 (SD=8.4). The mean (SD) obtained for the three dimensions were as follows: RoE 39.3 (SD=5.1), UoE 26.7 (SD=3.6) and AoE 33.5 (SD=5.3). All EI scores in our sample were normally distributed.

Factors Associated with the overall EI and its dimensions

Bivariate analysis

In the bivariate analysis, the association of each of the previously mentioned variables with the EI and its dimensions were estimated. The types of test used along with the corresponding *P* value of each association are presents in Table 2.

Except for the tow 'household size and graduate degree' variables which had no significant associations at the level of 0.05 with the total EI scores and its dimensions, other investigated variables in this study were associated with at least one of the EI dimensions or total score in the bivariate analysis.

Table 1: Distribution of the studied participants' demographic variables associated with EI and its dimensions (n=872)

Variable	Number (percentage)	Mean (SD) Total score*	EI	Regulation of emotions*	Utilization of emotions*	Appraisal of emotions*
Gender						
Female	604 (69.3)	125.2 (7.3)	39.8 (5)	26.9 (3.5)	33.9 (5.1)	
Male	264 (30.3)	124.7 (8.8)	38.1 (5.2)	26.2 (3.9)	32.6 (5.5)	
Unanswered	4 (0.4)	-	-	-	-	-
Educational group						
Medical	285 (32.7)	124.2 (0.49)	38.9 (0.33)	27 (0.25)	33.5 (0.37)	
Paramedical	267 (30.6)	126.4 (0.53)	40.6 (0.32)	26.6 (0.23)	34.4 (0.34)	
Non-medical	318 (36.5)	124.3 (0.57)	38.9 (0.32)	26.5 (0.21)	33.2 (0.31)	
Unanswered	2 (0.2)	-	-	-	-	-
Degree						
Bachelor	576 (66.1)	125.3 (0.40)	39.7 (0.23)	26.6 (0.16)	33.7 (0.23)	
GP	285 (32.7)	124.1 (0.49)	38.9 (0.33)	27 (0.25)	33.5 (0.37)	
Unanswered	11 (1.3)	-	-	-	-	-
Yr of entrance						
First	271 (31.1)	125.6 (0.56)	40.3 (0.32)	26.6 (0.23)	33.7 (0.35)	
Second	251 (28.8)	125.2 (0.50)	38.9 (0.32)	26.6 (0.24)	33.4 (0.37)	
Third	185 (21.2)	123.9 (0.61)	39.4 (0.44)	26.9 (0.33)	33.9 (0.41)	
Fourth	99 (11.4)	125.8 (1)	40.1 (0.50)	26.5 (0.36)	33.4 (0.56)	
Fifth and higher	62 (7.1)	123.9 (0.79)	37.6 (0.91)	27.1 (0.48)	33.9 (0.99)	
Unanswered	4 (0.5)	-	-	-	-	-
Marital Status						
Married	51 (5.8)	125.8 (1.2)	41.5 (0.85)	26.6 (0.61)	35 (0.62)	
Single	802 (92)	124.6 (2.1)	39.3 (0.18)	26.7 (0.13)	33.5 (0.2)	
Divorced – Widowed	16 (1.8)	124.9 (0.33)	37.5 (2.5)	24.6 (1.3)	31.5(1.9)	
Unanswered	3 (0.3)	-	-	-	-	-

* The range of attainable scores were (41-205) for total EI score, (10-50) for RoE, (7-35) for UoE and (9-45) for AoE

Multivariate analysis

In order to determine the adjusted associations of measured variables with the total EI score and its dimensions, four multiple linear regression models were fitted. As mentioned in the analysis section, the dependent variables in these models were the EI total score and its three dimensions (RoE, UoE and AoE).

Table 3 demonstrates the adjusted associations of educational category along with the other covariates with the total EI score and its dimensions. The variables shown in Table 3 were either the ones that had a significant association with at least one of the EI dimensions or total EI score,

or the ones that had remained in the final models by the backward method. As shown in this table, only the two 'educational group' and 'constructed area per capita' variables were associated with the total EI score. The total EI score in the paramedical and non-medical students was higher than the medical students scores; 3.9 ($P < 0.001$) and 1.65 ($P = 0.04$) respectively. In the RoE dimension, the quality of life showed a significant association. This means that with each one-unit increase in the quality of life score, the RoE score increased by 2.5 units ($P < 0.001$).

Table 2: Bivariate associations between measured covariates and total EI score and its dimensions

Independent variable	n	Test type	Total EI	Regulation of emotions	P-value	
					Utilization of emotions	Appraisal of emotions
Educational group (medical, paramedical, non-medical)	870	Anova	0.008	<0.001	0.162	0.076
Overall quality of life	860	Regression	0.169	<0.001	0.260	<0.001
Age	870	Regression	0.940	0.947	0.545	0.026
Gender (male – female)	872	T-test	0.209	0.020	0.138	0.103
Marital status (married, single, divorced – widow)	869	Anova	0.792	<0.001	0.100	0.080
Graduate degree (BA – GP)	870	T-test	0.224	0.199	0.110	0.330
Successfully passed academic yr	871	Regression	0.070	0.014	0.360	0.533S
Academic yr of entry (first, second, third, fourth, fifth and higher)	868	Anova	0.083	<0.001	0.900	0.825
Place of birth (Tehran, county)	864	Regression	0.031	0.510	0.880	0.310
Current residence (dormitory, private house, paternal house)	864	Anova	0.028	0.193	0.450	0.620
Constructed area per capita	767	Regression	0.014	0.778	0.062	0.366
GPA of previous semester	585	Regression	0.182	0.025	0.121	0.700

Similarly, gender was significantly associated with the mean score of RoE ($P < 0.001$). The mean score of this scale was 2.58 units higher in females than in males. Meantime, the university entrance yr variable was significantly associated with the score of this dimension; meaning that the mean score of this dimension in the fifth-yr and senior students was 1.55 units lower than the first-yr students ($P = 0.022$). Regarding the dimensions of UoE, the scores of paramedical and non-medical students were significantly 1.15 and 0.87 units lower than the medical students' scores respectively. Moreover, the mean score of UoE dimension was 1.29 units higher in females than in males ($P < 0.001$). This finding imply that the female students' ability to use emotions in order to solve problems is 1.3 units higher than the male students' ability ($P < 0.001$). Constructed area per capita, unlike the total EI score, showed a negative association with the score of this dimension ($P < 0.001$).

As shown in Table 3, AoE is the only dimension that had a significant association with the age ($P = 0.002$), which means the ability of recognition of emotion in oneself and others increased 0.25

units for each yr increase in students' age. Meanwhile, the female mean scores in this dimension on average was 1.2 units higher than the males ($P = 0.003$). Quality of life also showed a significant association with the obtained score of this dimension, so that by each one-unit increase in the quality of life the mean score of this dimension increased by 1.55 ($P < 0.001$). Moreover, educational group showed no significant association with the score of AoE. Adjusted R^2 values in this study were 2.3 for total EI score and 5.8, 21.4 and 7.7 percent for the domains of UoE, RoE and AoE respectively.

Discussion

EI has increasingly been researched in the past two decades (18) and many academic papers have been published about it (3). Obviously, due to its essential role in occupational life and academic successes, the identification of factors associated with EI in relevant researches has a considerable importance (23).

Table 3: Variables associated with the total EI score and its three dimensions in multiple linear regressions (backward method)

Variable	Total EI score	Coefficients (<i>P</i> value)		
		Regulation of emotions	Utilization of emotions	Appraisal of emotions
Educational category				
Medical*	-	-	-	-
Paramedical	3.91 (<0.001)	-	-1.15 (0.017)	0.69 (0.125)
Non-medical	1.65 (0.040)	-	-0.87 (0.011)	-0.09 (0.828)
Age	-	-	-	0.25 (0.002)
Gender	-			
Male*	-	-	-	-
Female	-	2.58 (<0.001)	1.29 (<0.001)	1.17 (0.003)
Marital Status	-			
Married*	-	-	-	-
Single	-	-1.45 (0.295)	-	-
Divorced - Widowed	-	-1.27 (0.082)	-	-
Economic status (constructed area per capita)	0.05 (<0.001)	-	-0.02 (<0.001)	-
Quality of life	-	2.46 (<0.001)	-	1.55 (<0.001)
Academic yr of entry	-			
First*	-	-	-	-
Second	-	-0.69 (0.096)	-	-
Third	-	-0.53 (0.253)	-	-
Fourth	-	-0.03 (0.954)	-	-
Fifth and higher	-	-1.55 (0.022)	-	-
Dormitory*	-	-	-	-
Paternal house	-	-0.34 (0.334)	-	-
Private house	-	0.74 (0.248)	-	-
GPA of last semester	-	-	-0.16 (0.090)	-

* Baseline level

The normal distribution of EI scores in this study was consistent with the results of previous studies, which provided the possibility to use parametric tests and modeling (2, 24). In our study, non-medical and richer students obtained significantly higher total EI scores than medical and poorer students. While the UoE scores of them were significantly, lower than medical and poorer students. Therefore, the medical students' capabilities in utilizing their emotions to problem solving were higher than paramedical and non-medical students' abilities. Despite the absence of gender differences in the total EI score, its adjusted associations with all three EI dimensions were significant. However, that the mean scores for each of these three dimensions were significantly higher in females than males. This finding indicated higher abilities of the female students in

all three dimensions of identification, application and regulation of emotions. These findings are consistent with the other previous studies' findings (25, 26). For example, a study on first and second year medical students in the US, where their total EI scores were based on the Meyer-Salovey-Caruso EI Test (MSCEIT) questionnaire, showed no significant difference between male and females, but in the UoE dimension the mean score was approximately 3 points higher in females than in males (25). However, the non-significant association of gender and total EI score was inconsistent with the findings of other studies (2, 12, 17, 23, 24, 27). For example, in Carr et al.'s study, carried out on 177 senior medical students, the mean EI was higher in males than in females (24). However, some studies in which MSCEIT questionnaire was used and performed

on 263 medical students, show the mean score to be higher in female students than males (2). This finding was confirmed by the Mayer et al., too (28).

The age variable had significant association only with the AoE dimension. This means that for each one-unit increase in students' age, the mean score of the AoE increased by 0.250 units ($P = 0.002$). The latter finding is consistent with the results of several studies (2, 27, 29-31). For example, in a study conducted by Todres et al., the EI score was lower in the two understanding and managing dimensions in the younger age group (under 25 yr old). However, like to our study, there was no significant difference in the total EI scores among the age groups (2, 9). Mayer et al. have also stated that EI mean scores in the age group of 17 to 24 yr old were slightly lower than the older age groups' scores (30). This could explain to some extent the lower obtained scores for total EI and its dimensions in our study in comparison with the other studies. Moreover, the narrow age-range of participants in our study may be considered as one of the reasons behind non-significant observed associations between age and total EI score and its two other dimensions.

Although students' marital status showed significant association with the score of the RoE dimension in the bivariate analysis, it did not have any significant adjusted association with the total EI and its dimensions' scores in multivariate analysis. In Taiwan, a study conducted by Min on 380 tour guides showed no association between marital status and EI (32).

Though the socio-economic status had a direct significant association with total EI score, it showed a significant inverse association with the obtained score from the UoE dimension. In a study conducted on 200 young people aged 16 to 19 yr in three Midwestern high schools, it was shown that by increasing the household income, the EI scores would also increase (23). Whereas the household income showed no significant association with EI score in Conger et al.'s study (29). However, due to existent differences in the target population and type of analysis (bivariate vs. multivariate) used, certain problems appear to

exist when comparing the results of our and aforementioned studies.

Entrance year showed a significant association with the RoE dimension alone. The mean scores of EI dimensions in all of the entrants were less than the first-yr students' scores. Nevertheless, the only significant associations were those of the fifth-yr and senior students. The prolongation of education period seems to be associated with the students' decreased ability in the RoE dimension. Quality of life had positive significant association with the RoE and AoE scores. The modifiable nature of the quality of life reveals the significance of promoting the students' quality of life, in order to improve the RoE and AoE dimensions of their EI. However, as the present study measured the quality of life with only a single question, it is recommended that further studies regarding this association be conducted (21). On the other hand, reverse causality should be considered in the interpretation of this association, this means that the higher EI cause better quality of life.

The last semester's grades GPA had no-significant association with the total EI and its dimensions. Meanwhile in a study on 1563 secondary school students in Nigeria, EI introduced as a predictor for academic success (33).

Although adjusted R^2 values in this study were either better or comparable with other studies (2, 23, 29), the regression models in our study and the other similar studies have not explained a large percentage of the variance of EI. One reason for these low obtained values of adjusted R^2 could be the possible nonlinear association between the mentioned covariates and EI. This issue also reveals the need to investigate for other EI predictors in future studies.

The self-rated method used for data gathering could have led to information bias along with an increased percentage of unanswered questions. In the other words, we measured perceived rather than actual EI, which is susceptible to desirability bias answers.

Similar distribution of certain independent variables (such as gender and age) among the study's participant and reference population of students reduced the probability of selection bias.

Finally, the cross-sectional method used in this study is one of the other limitations. Therefore observed associations between the measured factors and EI must be interpreted with caution.

Further study on the association between EI and the students' entrance exam score as well as their academic success is recommended. The significant association between the students' quality of life and EI determines the importance of intervention programs aimed at improving their quality of life.

Conclusion

Lower levels of total EI scores of medical students in comparison with paramedical and non-medical students in the present study reveals the importance of attention to the EI by the relevant authorities to both selection and training of students. The improvable nature of EI, its important influence on academic achievement, communication skills, educational problem solving and success in the medical field reemphasizes the need for its improvement using appropriate interventions in medical students.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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