

RESEARCH ARTICLE

Evaluation of emotional intelligence, sleep quality, and fatigue among Iranian medical, nursing, and paramedical students: A cross-sectional study

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ABSTRACT

Background: Sleep disorders and fatigue in students may affect emotional intelligence, which is associated with increased risk of cognitive and mental disorders. The aim of this study was to determine sleep quality, fatigue, emotional intelligence, and related factors in Iranian medical students.

Methods: This cross-sectional research was conducted in 2016. A total of 400 students were randomly selected from Semnan University of Medical Sciences. Data collection tools included questionnaires for demographic information, the Pittsburgh Sleep Quality Index, and Bradbury-Graves's Emotional Intelligence Inventory and Multidimensional Fatigue Symptom Inventory-Short Form (MFSI-SF). **Results:** The quality of sleep was unsatisfactory for 38.5% students, 86.2% did not have general fatigue, and 13.8% were suffering from low overall fatigue. Moreover, 6% displayed low, 24% normal, and 70% high emotional intelligence. Emotional intelligence showed a positive correlation with sleep quality ($p = 0.044$) and a negative correlation with general fatigue ($p = 0.018$). Sleep quality showed a negative correlation with general fatigue ($p < 0.001$).

Conclusion: This study demonstrated a significant relationship between sleep quality and fatigue with emotional intelligence and a significant relationship between sleep quality and fatigue.

Keywords: emotional intelligence, quality of sleep, fatigue, medical student

INTRODUCTION

Emotional intelligence (EI) is defined as "the subset of social intelligence that involves 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".¹ This has been identified as an important factor for healthcare students.¹⁻³ Considering EI as a competency, it encompasses 12 abilities, including emotional self-awareness and self-control, achievement orientation, adaptability, empathy, positive outlook, organizational awareness, coach and mentor, influence, conflict management, inspirational leadership, and teamwork. Currently, EI and empathy are more than ever essential components of the competencies required of physicians.⁴ EI works as an adapting tool.⁵ Higher EI positively contributes to the patient-physician relationship, increased teamwork and communication skills, empathy, stress management, leadership, organization commitment, and higher academic performance.⁶⁻⁹ A systemic review suggests that high EI predicts academic success, improved patient care, empathy, optimism, ability to solve problems efficiently, and social skills.¹⁰

Evidence suggests that EI capabilities, including self-awareness, interpersonal communication, acceptance skills, and individual adaptation, are associated with better compatibility, although these characteristics are not as important as intelligence quotient; however, they are equally significant in achieving a successful life.¹¹ EI is an appealing field of research for occupational health.¹² EI is a necessary capability for people who deal with patients.¹³ EI in the medical field has an impact on academic performance, interpersonal communication, and leadership.¹⁴ Therefore, it is of great importance in medical education for various healthcare staff, physicians, and nurses.¹⁵ It is imperative to assess and focus on the EI of medical students who will become physicians in a short space of time and will be in close contact with patients. Medical students as future physicians must be able to communicate with patients so as to comprehend their feelings and emotions in the right manner.¹⁶ Higher EI is related to better personal and social skills.¹⁶

A previous study indicated that sleep problems are a common occurrence in college students. Insomnia, nightmares, and impaired sleep quality lead to several mental health issues, as well as impaired academic performance.¹⁷ According to previous findings, sleep deprivation causes temporary changes in brain metabolism, cognition, emotions, and morals, and it can also lead to mild prefrontal cortex dysfunction and consequently problems with motivation, individual flexibility, planning, and management.¹¹ Evident

following 24 hours of continuous wakefulness, the prefrontal cortex appears to be particularly sensitive to the effects of sleep deprivation, with significant declines in metabolic activity.^{18,19} Dysfunction within the ventromedial prefrontal cortex is associated with impaired EI, whereas to cope flexibly with changing demands, intact functioning of this region is necessary.²⁰ Sleep deprivation not only affects pure cognitive abilities but also affective functions that are central to personality and social interaction, capacities that are likely to play a central role in EI. It would be particularly interesting for future studies to directly compare the effects of sleep deprivation on objective measures of EI.²⁰ Sleep deprivation can have adverse effects on the emotional processing of information.²¹ Therefore, it appears that there is a close relationship between sleep and EI performance.²²

Sleep problems have an impact on students' mental acumen and activities such as memory, concentration, self-confidence, thoughts and positive emotions, individual health, learning capability, and academic performance.²³ Henry et al., also indicated that a large number of medical students have poor-quality sleep and less than one-third of them use drugs to sleep.²⁴ Adequate sleep with minimal delayed sleep is associated with higher academic performance, whereas insufficient sleep leads to fatigue, concentration problems, and tension problems.²⁵ Ghonsooly reported a lower fatigue score with higher EI.²⁶ Fatigue is a normal phenomenon that is a result of physical and mental exercises or emotional stresses. Fatigue may be created in a particular work period which makes the individual unable and hesitant to do physical and mental work. Fatigue results in increasing loss of energy, increased physical problems, higher physical undertaking, less motivation, and more drowsiness. Fatigue causes disability, burnout, yawning, drowsiness, and lack of interaction. When individuals feel fatigued and are not satisfied with their work; they will in general have an awful temper and feel nervousness, anxiety, and disinterest.²⁷ Fatigue can influence sleep quality as do nightmares, reducing sleep and decreasing academic performance.²⁸ Chronic fatigue can cause severe fatigue at work, less motivation, more distraction, and poor data processing. Furthermore, fatigue affects individual decision capabilities.²⁹

University students may have special stressors that make them different from other populations. EI, sleep quality, and fatigue are some of the key factors that

impact the ability to make decisions and in the individual, social, and academic performance of students. This is important to study because of the relatively high prevalence of problems related to EI, sleep quality and fatigue. Considering the significance of further research in medical sciences with regard to the necessity of examining the association of various demographic characteristics with EI, sleep quality and fatigue, the present study aimed to determine this relationship among Iranian medical students. The hypothesis of this study was that age, sex, marital status, field and educational level, location, and average two-semester scores correlate with sleep quality, EI, and fatigue among Iranian medical students.

MATERIAL AND METHODS

Study design and sample

This cross-sectional study was conducted in 2016 on 400 female and male students in Semnan University of Medical Sciences within the fields of medicine, nursing, and paramedical sciences. The students were selected using the systematic random sampling method.

Inclusion criteria

All students from different fields in Semnan University of Medical Sciences were included in this study.

Exclusion criteria

Guest students, transitional students, and graduates were excluded. Students who had no willingness to participate in studying and completing the questionnaires were also excluded from the study.

Data collection

The first step involved obtaining approval from professors to attend the end of a session after the teacher had left to explain the research objectives to the students that would participate. Every other student was selected, in other words, one student was chosen, then the next student was not chosen, and then the subsequent student was chosen and so on. The study questionnaires were then distributed among them.

Data collection tools consisted of the Demographic Profile Questionnaire, the Pittsburgh Sleep Quality Index (PSQI), and Bradbury-Graves's Emotional Intelligence Inventory and Multidimensional Fatigue Symptom Inventory-Short Form (MFSI-SF).

The demographic questionnaire consisted of age, gender, marital status, field of study, educational level, average scores of last two semesters, and residence.

The PSQI evaluates seven sleep components, including sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, sleep medication use, and daytime dysfunction. Total scores ranged from 0 to 21, with 6 or more indicating sleep quality disorders.³⁰ The validity of this questionnaire has also been examined in the Iranian society, with a sensitivity of 100%, a specificity of 93%, and a Cronbach's alpha of 0.89% for the Persian version.^{31,32}

Bradbury-Graves's Emotional Intelligence Inventory consisted of 28 questions in four dimensions (each containing 7 questions) of self-awareness (1–6), self-management (7–15), social awareness (16–20), and relationship management (21–28). Scoring was based on the Likert scale (1–2–3–4–5), including 1 = strongly disagree, 2 = slightly disagree, 3 = neutral, 4 = slightly agree, and 5 = strongly agree and numbering from 1 to 5 for positive attitudes and from 5 to 1 for negative attitudes. The highest score is 140, and the lowest score is 0. Scores closer to 140 indicate higher EI, scores < 60 indicate low EI, scores 60–80 indicate normal EI, and scores > 80 show very high EI. This questionnaire has acceptable validity and reliability in Iran.³³

The MFSI-SF included 30 items consisting of five dimensions, general fatigue (1–6), physical fatigue (7–12), affective fatigue (13–18), mental fatigue (19–24), and vigor (25–30). Each question was scored based on the 5-point Likert scale from 0 to 4, (0) indicating not at all, (1) low, (2) medium, (3) high, (4) and very high. The score for each dimension ranged from 0 to 24, which is calculated separately, but the score of the first four dimensions is subtracted from the score of the vigor dimension to calculate the total fatigue scores, indicating 0–30 = no fatigue, 31–60 = mild fatigue, 61–90 = moderate fatigue, and 91–120 = severe fatigue.³⁴ The Cronbach's alpha for this questionnaire has been reported to be 0.3–0.7.³⁵

Ethical approval

Ethical considerations included obtaining approval from the deputy of research at Semnan University of Medical Sciences, getting the Ethics Code from the Ethics Committee of the University, explaining the

research objectives to the participants and obtaining their agreement to participate in the research, obtaining informed written consent, and assuring the students of the confidentiality of the information received.

Statistical analysis

Data were analyzed by the SPSS software version 18 using the Kolmogorov–Smirnov, Mann–Whitney, and Kruskal–Wallis tests and the partial correlation coefficient at a significance level of 0.05.

RESULTS

Sample characteristics

Among the study population, 57.2% of the students were women. The mean \pm standard deviation of students' age was 22.4 ± 2.9 years. The youngest participant age was 18 years, and the oldest was 44 years; the median age of students was 22 years. Furthermore, 88.2% of the students were single, 33.5% were undergraduates, 1.8% were graduates, and 64.8% were general physician students. Regarding the field of study, 64.8% of the students were in medicine, 16.8% were in nursing, and 18.5% were in paramedical sciences. Regarding residence, 40.8% lived in a dormitory, and the remainder had a private home. The average two-semester scores were ≥ 17 out of 20 for 21.8% of the students (considered good), 15–16.99 out of 20 for 60.5% (considered average), and < 15 out of 20 for 17.8% (considered poor). Table 1 shows the distribution of the demographic characteristics of the students.

Outcomes

In this study, 38.5% of the students were found to have inadequate sleep quality. The mean score of sleep quality was 5.17 ± 2.93 . The lowest and highest scores of sleep quality were 0 and 18, respectively. Inadequate sleep quality was observed in 38% of males and 38.9% of females. In addition, 28% of students below the age of 20 years, 40.7% of students aged 20–21 years, 39.5% of students aged 22–23 years, and 39.8% of students aged ≥ 24 years had inadequate sleep quality. Moreover, 29.8% of married students and 39.7% of single students had inadequate sleep quality. It was also found that 39% of medical students, 28% of Master's students, and 38.1% of Bachelor's students had inadequate sleep quality. Furthermore, 39% of medical students, 44.8% of nursing students, and 31.1% of paramedical

Table 1. Distribution of demographic characteristics of students.

Individual characteristics	Number	Percent
Gender		
Female	229	57.2
Male	171	42.8
Age (Year)		
< 20	50	12.5
20–21	108	27.0
22–23	119	29.7
≥ 24	123	30.8
Marital status		
Single	353	88.2
Married	47	11.8
Educational level		
Medical Student	259	64.8
M.Sc.	7	1.7
B.Sc.	134	33.5
Field of study		
Medical	259	64.8
Nursing	67	16.7
Paramedical	74	18.5
Residence		
Dormitory	163	40.8
Residing in private house	237	59.2
Average scores of last two semesters [#]		
< 15	71	17.7
15–16.99	242	60.5
≥ 17	87	21.8

[#]In Iran the scores of students ranged from 0 to 20 for each course unit. Scores ≥ 17 are considered as good, scores 15–16.99 are considered as average, and scores < 15 are poor.

students had inadequate sleep quality. In terms of residence, 37.4% of dormitory students and 39.2% of students residing in private homes had inadequate sleep quality. In relation to academic performance, 33.8% of students with an average two-semester score of < 15 , 40.5% of students with an average score of 15–16.99, and 36.8% of students with an average score of ≥ 17 had inadequate sleep quality. There was no significant difference in sleep quality and individual characteristics of the students such as age, gender, marital status, field of study, educational level, average scores of last two semesters, and residence. The mean, standard deviation, median, and interquartile range of sleep quality scores of students based on individual characteristics are presented in Table 2.

Table 2. Mean, standard deviation, median, interquartile range, and partial correlation coefficient of sleep quality scores of students based on individual characteristics.

Individual characteristics	Sleep quality scores					r	p value
	Mean	SD*	Median	IQR**			
Gender							
Female	5.14	3.09	4.00	4.00		–	0.411
Male	5.20	2.70	5.00	3.00			
Age (Year)							
< 20	4.46	2.33	4.00	4.00	0.054		0.282
20–21	5.37	2.77	5.00	3.00			
22–23	4.85	2.57	4.00	3.00			
≥ 24	5.58	3.49	5.00	4.00			
Marital status							
Single	5.20	2.88	5.00	4.00		–	0.218
Married	4.91	3.26	4.00	4.00			
Educational level							
Medical Student	5.13	2.91	5.00	4.00	0.020		0.69
M.Sc.	4.00	3.05	4.00	5.00			
B.Sc.	5.29	2.95	5.00	4.00			
Field of study							
Medical	5.13	2.91	5.00	4.00		–	0.469
Nursing	5.49	3.08	5.00	4.00			
Paramedical	4.99	2.84	4.00	3.00			
Residence							
Dormitory	5.18	2.94	5.00	4.00		–	0.875
Residing in private house	5.15	2.93	5.00	4.00			
Average scores of last two semesters#							
< 15	4.99	2.48	5.00	3.00	0.009		0.850
15–16.99	5.21	3.01	5.00	4.00			
≥ 17	5.20	3.04	5.00	4.00			

*SD: Standard deviation, **IQR: Interquartile range.

#In Iran, the scores of students ranged from 0 to 20 for each course unit. Scores ≥ 17 are considered as good, scores 15–16.99 are considered as average, and scores < 15 are poor.

In this study, 86.2% of students had no total fatigue and 13.8% of students suffered from total fatigue. The mean total fatigue score was 21.73 ± 8.64 . The lowest score was 2, and the highest score was 53. The mean fatigue score was 20. There was no significant relationship between total fatigue and gender ($p = 0.352$), age ($p = 0.50$, $r = -0.098$), marital status ($p = 0.793$), educational level ($p = 0.629$, $r = 0.024$), field of study ($p = 0.292$), residence ($p = 0.379$) or average score of last two semesters ($p = 0.17$, $r = 0.069$) (Table 3).

In this study, 6% of students had low EI, 24% had normal EI, and 70% had high EI. The mean EI score was 87.45 ± 17.27 . The median EI score was 89.00 with

an interquartile range of 21. The lowest score was 23, and the highest score was 131. No significant relationship was found between EI and the variables of gender ($p = 0.932$), age ($p = 0.407$, $r = 0.042$), marital status ($p = 0.382$), educational level ($p = 0.073$, $r = 0.090$), field of study ($p = 0.159$), residence ($p = 0.228$) or average score of the last two semesters ($p = 0.37$, $r = 0.051$) (Table 4).

By eliminating the effect of sleep score, a negative and significant correlation was found between EI and total fatigue ($p = 0.018$, $r = -0.119$). In addition, by removing the effect of total fatigue score, a negative and significant correlation was observed between EI score and sleep score ($p = 0.045$,

Table 3. Mean, standard deviation, median, interquartile range, and partial correlation coefficient of total fatigue scores of students based on individual characteristics.

Individual characteristics	Total fatigue scores					r	p value
	Mean	SD*	Median	IQR**			
Gender							
Female	21.89	7.92	21.00	9.00		–	0.352
Male	21.53	9.53	20.00	11.00			
Age (Year)							
< 20	18.70	8.59	18.00	11.00	0.098		0.050
20 – 21	22.46	8.28	20.00	.009			
22 – 23	21.53	7.66	21.00	10.00			
≥ 24	22.52	9.62	.0021	12.00			
Marital status							
Single	21.65	8.59	20.00	10.00		–	0.793
Married	22.32	9.02	21.00	11.00			
Educational level							
Medical Student	21.75	8.41	20.00	10.00	0.024		0.629
M.Sc.	21.43	6.24	20.00	12.00			
B.Sc.	21.72	9.20	20.00	11.00			
Field of study							
Medical	21.75	8.41	20.00	10.00		–	0.292
Nursing	22.63	9.10	21.00	11.00			
Paramedical	20.88	9.00	19.00	11.00			
Residence							
Dormitory	21.82	7.69	21.00	9.00		–	0.379
Residing in private house	21.67	9.27	20.00	11.00			
Average scores of last two semesters#							
< 15	22.28	8.94	20.00	11.00	0.069		0.170
15 – 16.99	21.91	8.37	21.00	9.00			
≥ 17	20.79	9.13	19.00	11.00			

*SD: Standard deviation, **IQR: Interquartile range.

#In Iran, the scores of students ranged from 0 to 20 for each course unit. Scores ≥ 17 are considered as good, scores 15 – 16.99 are considered as average, and scores < 15 are poor.

$r = -0.101$). Finally, by ignoring the effect of EI score, there was a positive and significant correlation between total fatigue score and sleep score ($p < 0.001$, $r = 0.425$).

DISCUSSION

This study showed that 70% of the students had high EI. Similarly, another study reported that the mean EI score of students was 102.29 ± 12.57 , consistent with the present study.³⁶ Suitable training and interventions for improving working environmental conditions and appropriate job choice are important factors in EI development.¹² Lolaty et al., (2014) reported that almost a quarter of the students they studied required an appropriate intervention for

enhancing their EI. Less than 20% required improvement in work related abilities, and more than 25% of junior students were required to improve their emotional skills in explicit fields. Due to the significant role of EI on students' mental health, the implications of this study comprise recognizing high-risk students and offering help and intervention to improve their EI. Furthermore, several methods such as training on interpersonal skills and interpersonal awareness, problem solving skills and approaches to coping with stress should be considered for EI improvement.³⁷ In this study, there was no significant correlation between EI and demographic characteristics of the students. However, a previous study indicated a

Table 4. Mean, standard deviation, median, interquartile range, and partial correlation coefficient of emotional intelligence scores of students based on individual characteristics.

Emotional intelligence scores						
Individual characteristics	Mean	SD*	Median	IQR**	r	p value
Gender						
Female	87.98	15.45	88.00	20.00	–	0.932
Male	86.73	19.47	90.00	22.00		
Age (Year)					0.042	0.407
< 20	89.16	15.43	89.50	23.00		
20–21	85.91	15.53	86.50	22.00		
22–23	88.60	14.50	89.00	18.00		
≥ 24	86.99	21.24	.0094	24.00		
Marital status					–	0.382
Single	87.22	17.12	89.00	21.00		
Married	89.17	18.49	94.00	26.00		
Educational level					0.090	0.073
Medical Student	88.06	18.07	90.00	21.00		
M.Sc.	88.71	18.55	85.00	28.00		
B.Sc.	6.208	15.61	86.00	21.00		
Field of study					–	0.159
Medical	88.06	18.07	90.00	21.00		
Nursing	84.81	17.69	86.00	23.00		
Paramedical	87.70	13.65	87.00	19.00		
Residence					–	0.228
Dormitory	87.33	13.68	87.00	18.00		
Residing in private house	87.53	19.39	91.00	23.00		
Average scores of last two semesters#					0.051	0.307
< 15	84.69	17.23	89.00	28.00		
15–16.99	88.02	18.00	90.00	22.00		
≥ 17	88.10	15.07	89.00	19.00		

*SD: Standard deviation, **IQR: Interquartile range.

#In Iran, the scores of students ranged from 0 to 20 for each course unit. Scores ≥ 17 are considered as good, scores 15–16.99 are considered as average, and scores < 15 are poor.

significant correlation between the EI of students and their age, gender, and educational level.³⁸ Bar-On (2000) also reported that higher age groups have higher levels of EI.³⁹

In this study, the academic performance scores of students ranged from 0 to 20 for each course unit. Scores ≥ 17 are considered to be good, scores from 15–16.99 are average, and scores < 15 are considered poor. The average two-semester scores were calculated for each student, and 17.7% of them had an average score < 15 in the last two semesters. In another study, 25.8% of students were found to have educational problems in relation to their EI.³⁷ EI has garnered extensive interest in a variety of fields.

EI is considered as a significant factor in both mental health and professional conduct of an individual.³⁷

In this study, 38.5% of students suffered from inadequate sleep quality, and the quality of sleep in the students was low. The prevalence of inadequate sleep quality has been reported to be 64.8% in students at the University of Portugal,⁴⁰ 54.7% in Taiwan,⁴¹ 22.7% in China,⁴² and 14.9% in Turkey.⁴³ In this study, 39% of medical students had sleep disorders. Similarly, an earlier study reported that 40.4% of medical students experienced sleep disorders.⁴⁴ In this study, there was no significant relationship between the quality of sleep and the demographic characteristics of the students.

Consistent with this finding, another study also found no significant relationship between demographic variables and sleep quality of the students.⁴⁵

In this study, 86.2% of students had no total fatigue. Moreover, the total fatigue showed no significant relationship with any of the individual characteristics. Similarly, another study reported a mean total fatigue score of 52.30 among students, implying that there was no fatigue syndrome in the students and the level of fatigue was low.⁴⁶ Diminishing overworking, sleeping enough, using good nutrition, and adequate rest to improve the work framework are essential for managing fatigue. In this context, it is important to devise appropriate rest time during work hours and also focus on the needs of the students.²⁷

In the present study, EI had a positive and significant correlation with sleep quality. A previous study also demonstrated that EI scores were significantly lower in people with sleep deprivation than in others.⁴⁷ Another study reviewed the effects of sleep on brain function, indicating the adverse effects of sleep deprivation on brain performance, information processing, and emotional memories.²² Weber et al., reported that more and better sleep increased the volume of gray matter in the areas of brain controlling mental perception and individual stimulant regulations in the medial prefrontal lobe and the orbitofrontal cortex. As such, the mental adaptation and performance of the individual increases, as well as EI and psychiatric disorders decreasing in these individuals.⁴⁸ Sleep deprivation also affects the functions mediated by the prefrontal cortex.^{18,49} In addition, sleep deprivation may induce a decline in adaptive cognition and effective coping, both of which are critical features of EI.⁵⁰ Following sleep deprivation, statistically significant decline in perceived EI has been detected, affecting three major areas of functioning, including stress management, intrapersonal awareness, and life skills.²⁰ Therefore, it has been suggested that higher EI may be able to promote better sleep quality.⁵¹ Another earlier study also indicated the importance of adequate sleep to sustain optimal EI.²⁰

In this study, EI had a negative and significant correlation with total fatigue. Similarly, another study showed that high EI was associated with a low feeling of fatigue.⁴⁶ These findings are consistent with recent correlational research showing that reduced EI is associated with higher levels of fatigue.⁵¹ Zeidner et al., indicated that EI was inversely associated with

fatigue among healthcare professionals.⁵² One possible explanation for these findings is that EI could facilitate the development of individuals' coping resources, such as adaptive explanations, healthy emotions, and adequate social support, which help them prevent mental and physical fatigue. EI is related to the experience of fatigue directly and indirectly. Higher EI, which involves adaptive perception and management of emotions that helps individuals differently interpret and manage fatigue symptoms is the theoretical premise for expecting this relationship.⁵¹ In addition, mediator variables such as optimism play a minor role in the relationship between EI and fatigue.⁴⁶ Higher EI was associated with less fatigue, as well as with the quality of sleep indirectly, establishing the relationship between EI and fatigue.⁵¹ It has been reported that lifestyle factors can influence sleep quality which can mediate the relationship between EI and fatigue partially.⁵¹ EI can be changed through effective intervention to enable the individual to cope with stressful environments and prevent physical and mental fatigue in the workplace.⁵³

In this study, sleep quality showed a negative and significant correlation with total fatigue. A previous study also showed that sleep deprivation and the resulting fatigue lead to a significant and relevant reduction in EI, including self-awareness, interpersonal communication skills, and stress management capability. Higher levels of fatigue were associated with lower total EI scores in that study.¹¹ These findings are consistent with the findings of the Killgore study. Previous studies have shown that in healthy workers, disturbed sleep causes fatigue⁵⁴ and more subjective sleepiness was observed in patients with fatigue.⁵⁵

There were a few limitations in this study, including the limited time that students could dedicate to completing the questionnaire, the extensive number of questions, and the overall length of the questionnaire which could have affected the responsiveness and quality of data obtained. It is recommended to compare EI between first-semester students and graduates to evaluate EI between students residing in the hometown and students from other cities, and to explore the effects of family, punishment such as humiliation and insults, and encouragement on the EI of students.

It is also necessary to establish a probable rationale for the process required to improve EI, and explore the various factors related to successful implementation

of EI programs.⁵⁶ EI programs should teach the individual to move from behaviors seeking self-gratification to understanding emotional needs in the self and others.⁵⁷ Further strong evidence of causality, as well as important clinical implications, could be derived from a randomized controlled trial of an intervention designed to increase EI and quality of sleep and decrease fatigue.

CONCLUSION

The findings of this study demonstrated a significant association of sleep quality and fatigue with EI, as well as a significant relationship between sleep quality and fatigue. Therefore, it appears that understanding the factors affecting the quality of sleep and fatigue among students and the relaxation methods for improving the quality of sleep and reducing the respective fatigue and thus promoting individual EI are of particular importance.

Although EI, sleep quality, and fatigue have been investigated in some medical students previously, this study explored the relationship among EI, sleep quality, and fatigue in students from different medical fields in Semnan University of Medical Sciences. The results of this study, in addition to the student population, as well as other nonmedical students, can provide valuable and important information for teachers, professors, researchers, employees, and, in general, all individuals who use EI in their daily work and life. A meaningful relationship among these parameters can be advantageous toward improving the performance of these students. Furthermore, the utilization of the results of this study can have beneficial effects on the learning process, interpersonal relationships, self-esteem, positive thoughts and feelings, and the capacity to cope with and control emotions in difficult situations.

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Authors contribution

Nona Abdali: Study conception/design; data collection; drafting of manuscript.

Monir Nobahar: Study conception/design, data collection/ analysis; drafting of manuscript; critical revisions for important intellectual content; supervision

Raheb Ghorbani: Study conception/design, data analysis; drafting of manuscript.

Conflict of interest

We attest that we have herein disclosed any and all financial or other relationships that could be construed as a conflict of interest and that all sources of financial support for this study have been disclosed.

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