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Exploring the Association Between Creativity, Emotional Intelligence, and Spiritual Intelligence Among Medical Students

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Abstract

Background: This study investigates the correlations between creativity, emotional intelligence, and spiritual intelligence (SI) in medical students and explores how demographic factors influence these traits.

Methods: This cross-sectional study was conducted at Shiraz University of Medical Sciences among 234 medical interns (final-year students) in 2023. Data were collected via self-reported online questionnaires, including the Hildebrandt Spiritual Intelligence Questionnaire, the BarOn Emotional Quotient Inventory (EQ-i), and the Abedi Creativity Test (CT). Descriptive statistics, Spearman's correlation, and other appropriate statistical tests were applied using SPSS version 26.

Results: The median age of participants was 25 (2). Creativity, emotional intelligence, and SI had median scores of 76 (24), 134 (14), and 62 (19), respectively. Spiritual intelligence correlated positively with creativity ($r = 0.398$, $P < 0.001$), while no significant correlations were found between emotional intelligence and either SI ($r = 0.104$, $P = 0.113$) or creativity ($r = -0.082$, $P = 0.209$).

Conclusions: This study demonstrated a significant positive correlation between SI and creativity in medical students. Moreover, we suggest that fostering SI can enhance creativity in medical students, improving problem-solving and innovation in medical practice.

Keywords: Spiritual Intelligence, Creativity, Emotional Intelligence, Medical Students, Medical Education

1. Background

Creativity is the ability to create something new or find a new solution to a problem (1). It is a multifaceted and multidimensional construct, not limited to innovation, but includes distinct types of thinking and habits that must be present in both individuals and society (2). Creativity is a fundamental ability and capability of individuals, playing a vital role in all aspects of life (3). It is defined as a mental process that enables individuals to think about novel and practical ideas (4, 5). For medical students, creativity is essential as it fosters problem-solving and innovative adaptation, enabling them to develop unique approaches to patient care and medical challenges (6). By understanding creativity in the context of other cognitive traits, we can better understand its role in improving patient outcomes and medical practice.

Intelligence is a multidimensional construct encompassing various dimensions, including social, emotional, practical, analytical, moral, and spiritual intelligence (SI) (7, 8). It is the capability to adjust to new life situations and problems and is described as the capacity to learn from previous experiences to strengthen oneself and adapt to one's surroundings (9, 10). Dana Zohar first introduced the term "spiritual intelligence (SI)" in her 1997 book (11). Spiritual intelligence is not about religion but about the part of the brain that allows us to hope and dream. It helps us visualize and connect to our purpose in life and triggers our intelligence to seek a greater good by distinguishing between moral and immoral (11, 12). Definitions of SI are separate from religiosity — existential intelligence (13). Kumar and Mehta defined SI as "the capacity of an individual to have a socially relevant purpose in life, with an understanding of the self and a high degree of

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conscience, compassion, and commitment to human values" (14). Spiritual intelligence is critical for medical students as it enhances resilience and empathy, which are crucial for effective patient care (15). Exploring the links between SI and other forms of intelligence can help improve medical education and practice, fostering more well-rounded healthcare professionals.

Emotional intelligence involves recognizing and managing one's own and others' emotions. A person with high emotional intelligence successfully integrates the three components of emotion: Cognitive, physiological, and behavioral (16). Higher emotional intelligence can help individuals cope with daily acute and chronic stressors and live happier lives (17, 18). A study of emotional intelligence in medical students found that it declines over time during their training (19). Emotional intelligence is critical for medical students as it enhances their ability to manage stress, communicate effectively, and empathize with patients, thereby improving clinical performance and patient care (20). Studying emotional intelligence along with creativity and SI helps us understand the key qualities needed for effective healthcare.

2. Objectives

While these three traits are often studied in isolation, their interconnected nature suggests they may collectively influence medical students' ability to cope with stress, adapt to challenges, and excel in patient care. Our study addresses a significant gap in the literature by examining the correlations between creativity, emotional intelligence, and SI in medical students. These traits are critical for enhancing adaptability, empathy, and innovation in medical education and practice.

3. Methods

3.1. Study Setting

This cross-sectional study was conducted among medical students in their internship (final year of medical school) at Shiraz University of Medical Sciences.

3.2. Sample Size Calculation

To estimate our minimum sample size, we used the correlation (r = 0.207) between SI and creativity reported by Shiri and Jadidi (21). A power analysis, with beta (β) = 0.20 (power = 1 - β = 0.80) and alpha (α) = 0.05, indicated a minimum of 188 participants. Accounting for a 10% dropout rate, we aimed to recruit 209 participants. The questionnaire for this study was distributed among the study subjects via the Internet. Questionnaires were collected with prior consent and without mentioning the students' names, ensuring complete confidentiality of the information. A convenience sampling method was used. The questionnaire was shared with medical interns at Shiraz University of Medical Sciences through major online student groups. These groups typically include students actively engaged in their internship programs. By using this method, we were able to access a readily available and relevant group of participants.

3.3. Inclusion and Exclusion Criteria

The inclusion criteria for this study were: (a) Medical students enrolled in the internship program at Shiraz Medical School, and (b) students who provided informed consent to participate in the study. Medical students were excluded if they met any of the following criteria: (a) Not currently enrolled in the internship program at Shiraz University of Medical Sciences, (b) did not provide informed consent to participate in this study, or (c) were currently on medical leave.

3.4. Data Collection Tool

3.4.1. Hildebrandt Spiritual Intelligence Questionnaire

The questionnaire consists of 24 questions rated on a Likert scale (0 for strongly disagree, 1 for disagree, 2 for neutral, 3 for agree, 4 for strongly agree). The total score for SI is the sum of the scores for its different questions, ranging from 0 to 96, with higher scores indicating higher SI (22). In the study by Teymournejad and Sarihi, the content and face validity of this scale were confirmed, and its Cronbach's alpha was calculated to be 0.92 (23). While specific content validity ratio (CVR) and Content Validity Index (CVI) values for the Persian version of the Hildebrandt Spiritual Intelligence Questionnaire were not explicitly reported in Teymournejad and Sarihi (23), the study did confirm the content and face validity of the scale. Furthermore, the validity of all questionnaires used in this study was supported by expert review.

3.4.2. BarOn Emotional Quotient Inventory (EQ-i)

This questionnaire consists of 43 questions (24). For scoring, each question is rated from 1 to 5 (strongly agree = 5, strongly disagree = 1). A higher score indicates higher emotional intelligence, with scores ranging from 43 to 215. The Cronbach's alpha for the entire test was reported to be 0.94. Najati and Meshkat demonstrated construct validity for the Persian EQ-i in Iranian English

language learners using confirmatory factor analysis [relative chi-square = 1.96, root mean square error of approximation (RMSEA) = 0.04] (25, 26).

3.4.3. Abedi Creativity Test

The Abedi Creativity Test (CT) was used to collect data, based on Torrance's theory (27, 28). The CT consists of 60 items with a three-point Likert scale ranging from zero (low creativity) to two (high creativity). The total score ranges from 0 to 120, with higher scores indicating higher creativity. The overall Cronbach's alpha of this test was reported by Heydarzadeh et al. to be 0.83. The Abedi CT demonstrated acceptable content validity (CVR = 0.80), as determined by the Lawshe method with expert review (29).

3.5. Statistical Analysis

The collected data were entered into SPSS version 27 (SPSS Inc., Chicago, IL, United States). Normality was assessed using the Kolmogorov-Smirnov test. Descriptive data were reported as frequency (percentage). Analytical data were presented as mean (SD) or median (IQR) based on normality. In this study, we employed Spearman's rank correlation coefficient to examine the correlation between variables, chi-square tests for analyzing categorical data, and appropriate numerical tests such as the *t*-test or Mann-Whitney U test based on the data distribution. Statistical significance was set at $P < 0.05$.

4. Results

In this study, 234 intern students from Shiraz Medical School participated. The median age of the participants was 25 (2). The median GPA of the students was 17 (1.9). Of the students, 139 (59.4%) were male, and the remainder were female. Among them, 72 (30.8%) were married, and the rest were single. Additionally, 126 (53.8%) were native students, while the rest were from other cities. The median overall creativity score of these students was 76 (24), considered to be in the medium group. The average emotional intelligence score was 134 (14), and SI was 62 (19), both of which are medium. There were no significant differences in SI and creativity between males and females (SI P-value: 0.374; creativity P-value: 0.055), but males scored significantly higher in emotional intelligence (P-value: 0.034). Married individuals scored higher than single individuals ($P < 0.001$). No significant differences were observed in emotional intelligence ($P = 0.505$) or creativity ($P = 0.271$) between married and single participants. Native students scored significantly higher in SI ($P = 0.008$) compared to non-native individuals. No significant differences were found in emotional intelligence ($P = 0.521$) or creativity ($P = 0.673$) between native and non-native medical students. Age was positively correlated with SI ($r = 0.163$, $P = 0.013$), suggesting that SI tends to increase with age. No significant correlations were found between age and emotional intelligence ($P = 0.113$) or creativity ($P = 0.314$). The GPA was negatively correlated with emotional intelligence ($r = -0.167$, $P = 0.013$), indicating that higher GPA scores were associated with lower emotional intelligence. No significant correlations were observed between GPA and SI ($P = 0.972$) or creativity ($P = 0.318$) (Table 1).

The Spearman correlation analysis revealed a significant positive correlation between SI and creativity ($r = 0.398$, $P < 0.001$). In contrast, the correlations between emotional intelligence and both SI ($r = 0.104$, $P = 0.113$) and creativity ($r = -0.082$, $P = 0.209$) were not statistically significant (Table 2).

5. Discussion

This study explored the correlations between creativity, emotional intelligence, and SI among medical students in their internship year. The findings revealed that SI positively correlated with creativity, while no significant associations were observed between emotional intelligence and the other two traits. Additionally, factors such as marital status and nativity influenced SI scores, highlighting the role of personal and demographic variables in shaping these attributes.

A study by Rahimi et al. (as cited in Tamannaeifar and Hossain Panah) examined the correlation between SI and creativity among medical students at Kashan University of Medical Sciences. The researchers found a significant positive correlation between SI and creativity ($r = 0.53$), suggesting that students with higher levels of SI tend to exhibit greater creativity. These findings align with the current study's results, which also identified a positive association between SI and creativity among medical students.

Our study found that SI increases with age among medical students. This suggests that as students mature, they gain more life experiences, which may help develop their reflective and spiritual capacities. The findings of the current study are consistent with those of Salehi and Hosseini (31), who examined the correlation between SI and creativity among students at Iran University of Medical Sciences. Their study also found a significant positive correlation between SI and creativity, highlighting the connection between these two variables. Similar to our results, no significant gender differences were observed in either SI or creativity.

Table 1. Comparative Analysis of Creativity, Spiritual Intelligence, and Emotional Intelligence with Demographic Factors of the Study

Variables	Emotional Intelligence	SI	Creativity
Gender			
Male	135 (11)	63 (17)	77 (25)
Female	133 (18)	60 (21)	73 (22)
P-value	0.034	0.374	0.055
Marital status			
Single	134 (12)	60 (20)	73 (23)
Married	134.5 (15)	68.5 (16)	79 (19)
P-value	0.505	< 0.001	0.271
Residence status			
Native	135 (14)	61.5 (15)	76 (26)
Not native	133.5 (13)	64.5 (15)	76 (17)
P-value	0.521	0.008	0.673
Age			
Correlation coefficient	0.104	0.163	-0.066
P-value	0.113	0.013	0.314
Gpa			
Correlation coefficient	-0.167	-0.002	0.068
P-value	0.013	0.972	0.318

Abbreviation: SI, spiritual intelligence.

Table 2. Correlation Between Emotional Intelligence, Spiritual Intelligence and Creativity

Variables	Emotional Intelligence	SI
Emotional intelligence		
Correlation coefficient	-	0.104
P-value	-	0.113
SI		
Correlation coefficient	0.104	1
P-value	0.113	-
Creativity		
Correlation coefficient	-0.082	0.398
P-value	0.209	< 0.001

Abbreviation: SI, spiritual intelligence.

Moreover, Salehi and Hosseini identified SI as a predictor of creativity (31).

We found that SI increased with age, consistent with the idea that spiritual development grows with experience. Shepherd et al. (32) linked spirituality to generosity in medical students. Although not focused on age, their work suggests that developing spirituality may foster virtues like generosity, potentially explaining our finding of higher SI and related virtues with increased age.

In our study, male medical students displayed significantly higher emotional intelligence scores compared to their female counterparts. This finding contrasts with research conducted by Venkatappa et al. (33), who observed that female medical students scored higher on emotional intelligence assessments. The observed differences could be attributed to cultural, educational, or methodological factors inherent in each study. There is no consensus on this issue among various studies (33, 34).

The study by Altwijri et al. (35) found a significant positive correlation between GPA and emotional intelligence, with academic achievement correlating positively with emotional intelligence scores. In contrast, our study revealed a negative correlation between GPA and emotional intelligence, suggesting

varying findings across different contexts and highlighting the need for further exploration.

This study had some limitations, including its cross-sectional design, which prevents establishing causality, and the use of self-reported questionnaires, which may lead to response bias. The sample was limited to medical students from one university, affecting generalizability. Future research should use longitudinal designs, include diverse populations, and incorporate objective measures to improve the validity of findings.

5.1. Conclusions

In conclusion, this study confirms a positive link between SI and creativity in medical students, highlighting the potential for interventions that foster SI to enhance creative problem-solving and innovation within medical practice. Furthermore, the observed influence of age and marital status on SI suggests that personal development and life experiences play a role in shaping these crucial attributes. These findings underscore the importance of incorporating strategies to support spiritual and creative development in medical education, potentially leading to more adaptable, innovative, and holistically skilled physicians.

Footnotes

Authors' Contribution: Study concept and design: M. A. , F. Z. , M. A., and H. R.; Acquisition of data: M. A. and F. Z.; Analysis and interpretation of data: H. R.; Drafting of the manuscript: M. A., F. Z. , M. A., and H. R.; Critical revision of the manuscript for important intellectual content: M. A., F. Z., M. A., and H. R.; Statistical analysis: H. R.; Administrative, technical, and material support: F. Z., M. A., and H. R.; Study supervision: F. Z. and M. A.

Conflict of Interests Statement: The authors declared no conflict of interests.

Data Availability: The data presented in this study are uploaded during submission as a supplementary file and are openly available for readers upon request.

Ethical Approval: The protocol approval by the Medical Ethics Committee approval ID: IR.SUMS.MED.REC.1401.261 .

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Informed Consent: The questionnaire was online and first question was consent to complete the questionnaire.

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