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Investigating alexithymia, empathy, and resilience in medical students during pandemic era: a cross-sectional study in northern Iran

Forouzan Elyasi¹ , Yeganeh Amirsoleimani², Romina Hamzehpour³ , Mahmood Moosazadeh^{4,9*} , Mehran Zarghami^{5,6,10*} , Maryam Vajdi⁷, Elham Motevalli Alamouti⁸ and Fatemeh Alizadeh Arimi⁸

Abstract

Background and aim Alexithymia is defined as emotional response inhibition. As well, empathy refers to the ability to put oneself in someone's position and resilience is the capacity to recover from a series of negative emotional experiences. Considering the psychological distress induced by the coronavirus disease 2019 (COVID-19) pandemic together with academic stress and the role of empathy in physician–patient relationships, the present study was to investigate alexithymia, empathy, and resilience in Iranian medical interns and residents.

Materials and methods This cross-sectional study was fulfilled in northern Iran in 2021–2022. In total, 394 medical interns and residents were initially recruited for this purpose. Then, an online sociodemographic survey form (SDSF), the Jefferson Scale of Empathy (JSE), the Toronto Alexithymia Scale (TAS-20), and the Connor–Davidson Resilience Scale (CD-RISC) were completed. The data analysis was performed using the IBM SPSS Statistics (ver.26) software in regard to the $p < 0.05$ significance level.

Results The mean age of the study participants was 28.8 ± 5.00 . As well, 38.1% of these individuals were male, 62.2% of the cases were single, and 54.6% of them were medical interns. The mean value of empathy, resilience and alexithymia was 89.90 ± 14.00 , 49.75 ± 10.56 , and 46.40 ± 16.40 , respectively. No significant relationship was found between empathy and educational level ($p = 0.532$). As well, medical interns empathy and resilience than residents ($p = 0.000$ & $p = 0.000$, respectively). Besides, male participants had more empathy and resilience ($p = 0.000$ & $p = 0.007$).

Conclusion Low empathy and resilience in medical interns and residents, especially in women who make up the majority of them, can be a warning for health care in Iran.

Keywords Alexithymia, Empathy, Medical, Pandemic, Students, Resilience

*Correspondence:

Mahmood Moosazadeh
mmoosazadeh1351@gmail.com
Mehran Zarghami
mehran.zarghami@gmail.com

Full list of author information is available at the end of the article



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Introduction

Mental health is nowadays among the foremost components of quality of life in individuals and societies. As acknowledged, healthy and efficient members, namely, those who are balanced in terms of their mental and physical conditions, are assumed as the keys to progress and dynamism in all societies [1]. The academic years for medical students may be accompanied by many challenges and consequently hamper their academic performance [2].

Among the significant contributing factors in this respect, resilience has been defined as the ability to reach positive psychophysiological outcomes regardless of being subjected to adverse and stressful situations. It also refers to someone's capacity to pick up from persistent difficulties and restore oneself. This concept has been thus far utilized from both physiological and psychological aspects [3]. There are many factors such as age, gender, culture, views toward life, and personality traits in the formation of resilience in people [4]. As highlighted in loads of articles, resilience has been further pictured as flexible adaptation in the face of existing challenges at individual and social levels. It has been additionally described as a set of characteristics demonstrated by individuals over a period of time in order to succeed, live, and grow positively even with stressors or hard times [5]. This definition with its own dynamic nature accordingly helps distinguish quality from some psychological features, such as mental toughness [6, 7]. Martin and Marsh [8] in a series of studies at schools found a significant relationship between academic achievement and students' perceptions and behaviors, and then grouped the main dimensions of resilience into self-confidence or self-efficacy, coordination and planning, summary control, calmness mastery, and commitment and persistence [8]. In practice, the students with high resilience are supposed to have positive effects on the existing situations, and even control or influence some components of the academic system. Due to this characteristic, their continuous efforts are constructive and they can deal with inevitable and potentially threatening events without worrying or withdrawing [8]. As evidenced, medical students must thus brace themselves for various challenges not only in practice but also during training [9].

Emotions are the most important internal states that encourage adaptive behavioral outputs [10], and alexithymia has been also characterized by impairment in someone's ability to identify, understand, and describe one's feelings [11]. It is typically observed in patients with psychiatric disorders that often reduce their resilience [12]. In a dominant model, alexithymia is attributed to an extroverted cognitive style and the difficulty in expressing emotions and sharing one's feelings through words

[13]. If there are no neuropsychiatric disorders, alexithymia rarely changes across the lifespan in non-clinical populations, i.e., it is a relatively stable psychological trait [14, 15]. The interventions tapped for the treatment of depressive symptoms can be helpful in this line, and the variations in the levels of alexithymia are typically linked to the effectiveness of pharmacological treatments or psychotherapeutic approaches for depression [16, 17]. Alexithymia can be further seen as a spectrum from low to high in the general population, but then develop into clinical pathologies [18]. As an illustration, a negative correlation has been so far spotted between alexithymia and resilience in Chinese armed forces and Iranian students [19, 20].

On the other hand, in the medical literature, empathy has been introduced as the basis of medicine, which has numerous benefits for patients and physicians [21]. In psychiatry, an empathic attitude accordingly allows therapists to reach valuable subjective information about their patients. Seeking to understand patients' feeling, expressing interest and showing concerns have very positive effects on physician–patient relationships [22]. Also, physicians who express empathic concerns for their patients are less likely to be prosecuted for unprofessional conduct [23–25]. Accordingly, adding brief empathic statements related to the scenarios taken out of emergency departments had resulted in a significant decrease in patients' thoughts about legal processes and lawsuits [26]. Empathic feedback in the form of positive and sympathetic comments significantly relieves the intensity of the pain experienced compared to neutral and non-sympathetic comments [27, 28]. Empathy can also be an effective factor in resilience. In this manner, empathy refers to the ability to experience the feelings of others and achieve cognitive adaptation to promote better interpersonal relationships. There are also some clues suggesting a reciprocal relationship between empathy and resilience; however, a significant correlation between both concepts is even now doubtful [12].

Resilience, which seems to be associated with individuals' long-term ability to survive and thrive during adversities, appears to be grossly underestimated in clinical education.

Research objectives

According to what was mentioned, it seems that dyslexia, empathy, and resilience should be addressed in medical students as one of the groups that face many problems especially during the epidemic of dangerous diseases, to promote their mental health. According to the few researches that have been conducted on these three variables simultaneously on the target population in Iran, the present study was conducted in order to investigate

alexithymia, empathy, and resilience in medical interns and residents in northern Iran during the COVID-19 pandemic.

Materials and methods

Statistical population

The statistical population consisted of interns and residents in various fields and specialties, delivering medical services at the teaching hospitals affiliated to Mazandaran and Babol Universities of Medical Sciences, in northern Iran in 2021–2022.

Design

This study with a descriptive cross-sectional design was conducted using the relevant self-administered questionnaires.

Ethical considerations

While complying with the ethical principles of the Declaration of Helsinki, this study started upon obtaining the permission from the Vice-Chancellor's Office for Research and Technology at Mazandaran University of Medical Sciences. All the samples were informed about the research objectives and were assured that their participation would be on a voluntary basis, and their personal information would remain confidential.

Statistical population

To estimate the sample size, the results of the study by Morice-Ramat et al. were used. In this study, the degree of correlation between resilience and empathy was 0.3. To determine the sample size using the sample size estimation formula, with the aim of calculating the Pearson correlation coefficient, according to the findings of that study, considering the confidence interval (CI) α of 95% ($\alpha = 0.05$), and the 90% test power ($\beta = 0.20$), the expected correlation coefficient ($r = 0.02$) for both area of the test, 185 people were estimated. The questionnaires were distributed electronically to all members of the research community, and finally 394 questionnaires were completed.

Inclusion criteria

Medical interns and residents with Iranian nationality were included in this study, and incomplete questionnaires and guest students were excluded from this study.

Instruments and data collection

The Persian versions of a series of questionnaires were self-administered in this study using an online platform. They were designed electronically by the Sadra Rayaneh Novin Tabarestan Engineering Co. (<http://form3.mazandums.ir>). Questionnaires distributed via the cyberspace,

including popular messaging apps, WhatsApp, Telegram, Instagram, and the Short Message Service (SMS) among interns and residents involved in therapeutic activities during the COVID-19 pandemic. The questionnaires were sent to the participants, individually or in group.

Sociodemographic Survey Form (SDSF)

The main items in the SDFS were about age, gender, marital status, nativeness, internship and residency duration, field of study and specialty, accommodation, place of living, history of psychiatric disorders, smoking, and use of psychotropic drugs, as well as working at COVID-19 wards in months.

Connor-Davidson Resilience Scale (CD-RISC)

The CD-RISC was developed in 2003 to measure resilience on a five-point Likert-type scale. The minimum and maximum scores in the CD-RISC could be 0 and 100. The scale composed of five components, including (i) personal competence, high standards, and tenacity; (ii) trust in one's instincts, tolerance of negative affect, and strengthening effects of stress; (iii) positive acceptance of change and secure relationships; (iv) control; and (v) spiritual influences [29]. Connor and Davidson [30] had reported its Cronbach's alpha coefficient as 0.89. Besides, the test-retest reliability coefficient of this questionnaire within a four-week interval had been equal to 0.87 [30]. As well, Ahangarzadeh and Rasoli [31] had investigated the psychometric properties of the Persian version of the CD-RISC. The internal consistency had been found to be $\alpha = 0.82$. As well, such values were equal to 0.75, 0.72, 0.74, 0.73, and 0.75 for the sub-scales of (i) personal competence, high standards, and tenacity; (ii) trust in one's instincts, tolerance of negative affect, and strengthening effects of stress; (iii) positive acceptance of change and secure relationships; (iv) control; and (v) spiritual influences respectively. Furthermore, the Pearson correlation coefficient (r) between the two test administration was calculated as 0.404 ($p < 0.05$) [31].

Jefferson Scale of Empathy (JSE)

JSE for medical students This scale consisted of 20 items and three sub-scales to measure empathy to patients in medical students, including (i) perspective taking (10 items), compassionate care (8 items), and walking in patient's shoes (2 items). This scale also had 10 negative items that could be scored in reverse. As a whole, the scores of the items in each component could be added to obtain their total score at the acceptable range of 20–140. The psychometric properties of this scale had been already confirmed by Karimi et al. [32] Its face validity was also established through a qualitative method. The content validity of given scale was higher than 0.79, and

it had relatively good internal consistency with the Cronbach's alpha coefficient of 0.63. In this line, $\alpha=0.71$ had been similarly reported in Rafati et al. [33].

JSE for healthcare professionals The scale contained 20 items under a five-point Likert-type scale. The total score could be at the range of 140–100. The minimum Cronbach's alpha coefficient of 0.7 was also considered for the reliability of this scale. This scale had further reached appropriate validity and reliability to measure empathy to patients in the Persian-speaking community, and the Cronbach's alpha coefficient had been reported as 0.83 [32, 34].

Toronto alexithymia scale-20 (TAS-20)

The TAS-20 comprised 20 items under three sub-scales of (i) difficulty in identifying feelings, (ii) difficulty in describing feelings, and (iii) externally oriented thinking on a five-point Likert-type scale. Examining the psychometric properties of the Persian version of the TAS-20, Cronbach's alpha coefficient for total alexithymia was 85%, and this value for the sub-scales of (i) difficulty in identifying emotions, (ii) difficulty in describing emotions, and (iii) externally oriented thinking was 82%, 75%, and 72%, respectively [34, 35].

Statistical analysis

The data were elicited from the online questionnaires in the form of a Microsoft Excel file, and then imported into the IBM SPSS Statistics (ver.26) software. Afterward, the descriptive statistics and the dispersion indices for the quantitative variables as well as frequency, percentage, and prevalence rate for the qualitative ones were employed. Pearson correlation test and regression analysis were operated to address the research hypotheses. All data analysis processes were performed using the IBM SPSS Statistics (ver.25) software with reference to the $p < 0.05$ significance level.

Results

Sociodemographic characteristics of participants

In total, 394 interns and residents were investigated. Table 1 illustrates the sociodemographic characteristics of the study participants.

The information about the participants' educational attainment and place of study is given in Table 2.

Alexithymia, empathy, and resilience scores

According to the Kolmogorov–Smirnov test outcomes, the data had a normal distribution, so parametric equations were utilized for calculation purposes. Table 3 displays the scores of alexithymia, empathy, and resilience. The mean score of empathy was thus 89.90 ± 14.00 . Of

Table 1 Sociodemographic characteristics of study participants

Characteristics	Categories	Frequency	Percentage
Gender	Male	150	38.1
	Female	244	61.9
Marital status	Single*	245	62.2
	Married	149	37.8
Age (year old)	20–30	266	67.5
	Over 30	128	32.5
Nativeness	Native	249	63.2
	Non-native	145	36.8
Accommodation	Dormitory	45	11.4
	Private home	245	62.2
	Living with family	104	26.4
Place of living	City	346	87.8
	Village	48	12.2
Residency duration	0	37	9.4
	1–5	116	29.4
	Over 5	26	6.6
History of smoking	Yes	52	13.2
	No	342	86.8
History of substance use	Yes	16	4.1
	No	366	92.9
	No answer	12	3
Type of substance	Cannabis	6	1.5
	Opium	1	0.3
	Tramadol	1	0.3
	Other	8	2
History of psychiatric disorders	Total	16	4.1
	No	329	83.5
	Yes	65	16.5

* Individuals with a history of previous marriage and divorce as well as the widowed ones

note, the minimum and maximum scores of empathy was zero and 140, respectively. Besides, the resilience mean score was 46.40 ± 16.40 , (the minimum score was 0 and the maximum value was 100). Furthermore, the mean value of alexithymia was 49.75 ± 10.56 , out of the minimum and maximum scores of 20 and 100, respectively.

Alexithymia, empathy, and resilience sub-scales

Table 4 shows the scores of the sub-scales of alexithymia, empathy, and resilience. Among the sub-scales of alexithymia, externally oriented thinking obtained the highest mean value (19.55 ± 3.45). With regard to the sub-scales of empathy, perspective taking had the mean score of 51.76 ± 9.44 , compassionate care acquired the mean value of 30.48 ± 10.82 , and walking in patient's shoes received the mean score of 7.65 ± 3.26 in the study samples.

Table 2 Characteristics of participants in terms of educational attainment and place of study

Characteristics	Categories	Subcategories	Frequency	Percentage
Medical students	Interns	Internship duration under 12 months	88	40.9
		Internship duration of 12 months or more	127	59.1
		All interns	215	54.6
	Residents	First year	43	24
		Second year	51	28.5
		Third year	42	23.5
		Fourth year	43	24
		All residents	179	45.4
	Total	–	394	100
	Specialty	–	Infectious diseases	9
Emergency medicine			1	0.3
Neurosurgery			1	0.3
Sports medicine			1	0.3
Pathology			3	0.8
Anesthesia			1	0.3
Radiology			5	1.3
Orthopedics			17	4.3
Psychiatry			63	16
Cardiovascular diseases			10	2.5
Urology			7	1.8
Neurology			7	1.8
Obstetrics and gynecology			5	1.3
General surgery			8	2
Children			7	1.8
Internal medicine			21	5.3
Other			12	0.3
Total	–	179	45.4	
Place of study	Mazandaran University of Medical Sciences	–	233	59.1
	Babol University of Medical Sciences	–	161	40.9
	Total	–	394	100
Characteristics	Mean ± SD	Median	Minimum	Maximum
Internship (month)	11.75 ± 5.58	12	1	24
Working at COVID-19 wards (month)	80.2 ± 6.87	6	1	36

Table 3 Mean and median scores of alexithymia, empathy, and resilience

Characteristics	Mean ± SD	Median	Minimum	Maximum
Alexithymia	49.75 ± 10.56	48	24	77
Resilience	46.40 ± 16.40	44.50	8	88
Empathy	89.90 ± 16	87.50	40	134

Relationship between alexithymia, empathy, and resilience and sociodemographic characteristics

Table 5 provides the relationship between alexithymia,

empathy, and resilience and sociodemographic characteristics. In view of that, no significant relationship was found between alexithymia and educational attainment ($p=0.117$). However, there was a significant relationship between empathy and resilience and educational attainment ($p=0.000$ and $p=0.000$, respectively). Accordingly, the intensity of resilience and empathy in interns was significantly higher than that in residents. A significant relationship was further spotted between resilience and empathy and gender ($p=0.000$ and $p=0.007$, respectively), as the intensity of resilience and empathy in men was higher than that in women. Nevertheless, there was

Table 4 Mean and median scores of sub-scales of alexithymia, empathy, and resilience

Characteristics	Mean \pm SD	Median	Minimum	Maximum
Alexithymia				
Difficulty in identifying emotions	16.94 \pm 5.61	16	7	34
Difficulty in describing emotions	13.26 \pm 6.4	13	5	25
Externally oriented thinking	19.55 \pm 3.45	19	10	31
Resilience				
Personal competence, high standards, and tenacity	15.28 \pm 6.23	15	1	32
Trust in one's instincts, tolerance of negative affect, and strengthening effects of stress	11.92 \pm 4.77	11	0	24
Positive acceptance of change and secure relationships	10.14 \pm 3.60	10	0	19
Control	5.41 \pm 2.46	5	0	12
Spiritual influences	3.62 \pm 1.76	4	0	8
Empathy				
Perspective taking	51.76 \pm 9.44	52	20	70
Compassionate care	30.48 \pm 10.82	30	10	53
Walking in patient's shoes	7.65 \pm 3.26	8	2	14

Table 5 Relationship between alexithymia, empathy, and resilience and sociodemographic characteristics

Variables		Alexithymia	Resilience	Empathy
Educational attainment	Intern	50.48 \pm 10.18	48.91 \pm 16.27	92.40 \pm 15.26
	Resident	48.87 \pm 10.95	43.38 \pm 16.09	86.91 \pm 11.67
	<i>P</i> -value*	0.117	0.000	0.000
Gender	Male	49.70 \pm 10.59	51.13 \pm 15.47	91.62 \pm 13.29
	Female	49.78 \pm 10.56	43.49 \pm 16.31	88.84 \pm 14.33
	<i>P</i> -value*	0.957	0.000	0.007
Age	20–30	50.92 \pm 10.72	48.88 \pm 16.27	91.19 \pm 14.84
	Over 30	47.31 \pm 9.80	43.32 \pm 16.29	87.32 \pm 11.67
	<i>P</i> -value*	0.002	0.006	0.013
Nativeness	Native	50.30 \pm 10.58	44.97 \pm 16.57	90.15 \pm 14.69
	Non-native	48.80 \pm 10.48	48.84 \pm 15.85	89.48 \pm 12.76
	<i>P</i> -value*	0.181	0.027	0.514
History of smoking	No	49.19 \pm 10.28	46.34 \pm 16.33	90.07 \pm 13.96
	Yes	53.44 \pm 11.65	46.76 \pm 17	88.82 \pm 14.34
	<i>P</i> -value*	0.021	0.831	0.738

* Mann–Whitney U test / Wilcoxon signed-rank test

no significant relationship between alexithymia and gender ($p=0.957$). Moreover, a significant relationship was found between alexithymia, resilience, and empathy and age ($p=0.002$, $p=0.006$, and $p=0.013$, respectively), so the intensity of alexithymia, resilience, and empathy among those aged 20–30 was significantly higher than that in the participants over 30. A significant relationship was also detected between resilience and nativeness ($p=0.027$). The intensity of resilience in non-native participants was significantly higher than that in the native ones ($p=0.027$). There was no significant relationship between alexithymia and empathy and nativeness

($p=0.181$ and $p=0.514$, respectively). The intensity of alexithymia in the individuals with a history of smoking was significantly higher than that in people without such a history ($p=0.021$).

The relationship between alexithymia, empathy, and resilience and a history of substance use, years of practice, therapeutic activities at COVID-19 wards, and a history of psychiatric disorders as self-reported is listed in Table 6. A significant relationship was further found between alexithymia and resilience and a history of psychiatric disorders ($p=0.003$ & $p=0.000$, respectively), so the participants with a history of psychiatric

Table 6 Relationship between alexithymia, empathy, and resilience and history of substance use

Variables		Frequency	Mean \pm SD	P-value**
History of substance				
Alexithymia	No	366	49.47 \pm 10.48	0.232
	Yes	16	52.12 \pm 10.30	
	No answer	12	55.08 \pm 12.31	
Resilience	No	366	46.39 \pm 16.38	0.935
	Yes	16	45.37 \pm 14.33	
	No answer	12	47.83 \pm 20.56	
Empathy	No	366	90.08 \pm 14.06	0.611
	Yes	16	89.18 \pm 12.01	
	No answer	12	85.41 \pm 14.78	
Years of practice				
Alexithymia	0	37	49.30 \pm 10.11	0.069
	1–5	116	53.13 \pm 10.02	
	>5	26	55.08 \pm 12.06	
Resilience	0	37	46.61 \pm 16.02	0.651
	1–5	116	45.28 \pm 14.87	
	>5	26	47.26 \pm 20.78	
Empathy	0	37	90.54 \pm 14.06	0.104
	1–5	116	89.18 \pm 12.42	
	>5	26	85.32 \pm 14.56	
Working at COVID-19 wards				
Alexithymia	No	151	49.36 \pm 10.82	0.460
	Yes	243	49.99 \pm 10.41	
Resilience	No	151	47.62 \pm 16.11	0.216
	Yes	243	45.63 \pm 16.56	
Empathy	No	151	91.38 \pm 14.93	0.100
	Yes	243	88.98 \pm 13.34	
History of psychiatric disorders				
Alexithymia	No	329	49.06 \pm 10.52	0.003
	Yes	65	56.26 \pm 10.12	
Resilience	No	329	48.10 \pm 16.30	0.000
	Yes	65	38.23 \pm 14.43	
Empathy	No	329	90.45 \pm 14.39	0.087
	Yes	65	87.13 \pm 11.49	

Kruskal–Wallis test**

problems had higher levels of alexithymia and lower resilience. Nevertheless, there was no significant relationship between empathy and a history of psychiatric disorders ($p = 0.087$).

Discussion

This study was to investigate alexithymia, empathy, and resilience in medical interns and residents in northern Iran during the COVID-19 pandemic.

Alexithymia

In this study, alexithymia was found to be moderate, which could augment the risk of mental disorders, especially in younger (30 years >) participants who acquired higher scores. Although gender was potentially an important risk factor in this respect, the present study did not demonstrate a significant difference in the prevalence rate of alexithymia between the male and female participants. These results were consistent with at least one previous study [35], even though the relevant research had identified gender as a significant risk factor [32, 34, 36, 37]. There were also conflicting results regarding gender-related differences for alexithymia across the related studies. In fact, some gender-specific differences had been reported in the general populations in Germany and Jordan [36, 38]. However, other studies in France or China had suggested that alexithymia could not be affected by gender [39, 40].

As well, smoking was introduced as a risk factor for alexithymia, which was in agreement with previous research reflecting a significant relationship in this respect [37, 41]. Some medical students might mistakenly resort to smoking as a stress-coping strategy [42]. They are thus more prone to higher levels of alexithymia. The cases with a history of psychiatric disorders or childhood abuse are also vulnerable to mental illnesses and suicidal behaviors. In this regard, the present study revealed that alexithymia was related to a history of psychiatric disorders. These individuals were not likely to share their problems with others due to alexithymia. In practical terms, those with alexithymia could have difficulty in expressing their emotions, which might result in substance use, major depression, and other psychiatric disorders [36, 43].

Lee et al. [44] demonstrated that the COVID-19 pandemic had negative consequences for mental health. However, it is unclear how and to what extent the psychological outcomes of this stressful event are moderated by individual characteristics. Given that alexithymia is a risk factor for psychopathology, and thus likely predicted individual differences in resilience or vulnerability to stressful events during the pandemic. They explored the moderating role of alexithymia in the relationships of pandemic-related stress with anxiety levels and attentional bias. Their participants were 103 Taiwanese individuals who completed a survey during the outbreak of the Omicron wave. Additionally, an emotional Stroop task including pandemic-related or neutral stimuli was used to measure attentional bias. Their results demonstrate that pandemic-related stress had a lesser impact on anxiety in individuals with a higher level of alexithymia. Moreover, they found that in individuals with higher exposure to pandemic-related stressors, a higher

level of alexithymia indicated less attentional bias toward COVID-19-related information. Thus, it is plausible that individuals with alexithymia tended to avoid pandemic-related information, which could temporarily relieve stressors during the pandemic [44].

Physicians suffering from alexithymia may not be accordingly able to understand the emotional difficulties of themselves and their patients, and this affects therapeutic alliance and treatments. Therefore, alexithymia should be addressed while medical students are still studying; otherwise, those who graduate with alexithymia are likely to have difficulty in managing their emotions, thereby potentially endangering patients.

Empathy

According to the JSE, the mean score of empathy in this study was 89.90 ± 14.00 . Elyasi et al. [45], investigating the relationship between attachment styles and empathy among medical interns and residents at MAZUMS, reported this value as 99.9 ± 44 , which was in line with the scores obtained by French medical students and physicians [12, 45]. However, the mean score of empathy in Iranian physicians had been reported to be 111 in Shariat et al.'s study (2010) in a sample of Iranian physicians [46]. As evidenced in Wen [47], the mean value of empathy had been 109.6 among Chinese medical students [47]. The scores of empathy in different countries are given in Table 7 [47, 48].

The empathy mean score in the same population at MAZUMS, had been 10 points higher than that in the present study, which can be attributed to the impact of the COVID-19 pandemic [45] or low motivation and hope in medical students in recent years and their tendency to migrate [49]. In their multicenter cross-sectional study on the tendency to migrate among medical residents ($n=254$) in Iran, Soltanizadeh et al. had found that 81.5% of the participants were willing to immigrate, while 79.5% of the cases had stated that they would prefer to migrate but not enroll in residency if they had their current insights into residency programs at the time of enrollment. This indicated that medical residency programs had significantly influenced the tendency to

migrate among residents in Iran. However, most participants had no plans to do so. The bulk of the students also believed that the best time to migrate was after obtaining a degree in general medicine. The main reasons for their tendency to migrate were disproportionate income as compared to the working hours and daily living expenses, better welfare in destination countries, and unequal pays and employment laws in the Iranian healthcare system [49]. Examining job burnout in healthcare professional during the first peak of COVID-19 on 7626 individuals across Iran, Kamali et al. [50] had further disclosed that 57.8% of the cases were nurses and 14.4% of the participants were physicians. As well, 44.8% of these individuals were working at COVID-19 wards. As a whole, job burnout had been seen in 18.3% of the samples [50]. In 2020, in times of COVID-19, Azizi et al. [51] in their web-based study with an online questionnaire had correspondingly evaluated mental health among healthcare professionals in Iran. They had found that 47.9% and 70.5% of these individuals had experienced the physical and psychological symptoms of anxiety respectively, and 44.8% of the participants had reported depression according to the Corona Disease Anxiety Scale (CDAS). The results indicated that anxiety among healthcare workers was significantly correlated with age ($p < 0.001$), gender ($p < 0.001$), having a children ($p < 0.001$), educational level ($p < 0.001$), occupation ($p = 0.016$), working units (COVID-19 isolated units) ($p < 0.001$), and the history of psychological problems ($p < 0.001$). The results also showed that anxiety is significantly correlated with gender ($p < 0.001$) [51].

Therefore, anxiety, depression, and burnout during the COVID-19 pandemic could have an effect on empathy. In this way, the present study showed that the increase in academic years of residency had made them suffer from job burnout, which was in agreement with previous research [50, 51]. It was concluded that with the increase of work pressures and daily life activities, residents are subjected to job burnout.

Whether empathy is influenced by gender or not is here and now debated. Male participants had more empathy scores in the present. In this regard, higher empathy had been reported in Portuguese and American female undergraduates [52, 53], but the male residents in North America and Brazil had demonstrated higher levels of empathy than their female counterparts [54, 55]. Elyasi et al. [45], investigating medical students at MAZUMS, had found no significant relationship between the empathy to patients and gender ($p=0.305$, CI 95% [-1.700 to 5.409]) [45].

As concluded in the recent study, the mean score of empathy in interns had been higher than that of residents (92.4 vs. 86.9). In other words, a significant relationship

Table 7 Comparison of empathy $M \pm SD$ in different countries

No.	Authors	Year	Country	$M \pm SD$	Instrument
1	Hojat & Gonnella	2015	Kuwait	90.42 ± 12.13	JSE
2	Lamothe et al	2014	the United States	89.90 ± 11.14	JSE
3	Lelorain et al	2013	France	91.2 ± 10.03	JSE
4	Shariat et al	2010	Iran	111.4 ± 12.02	JSE
5	Wen et al	2013	China	109.6 ± 9.42	JSE

had been observed between empathy and educational attainment ($p=0.000$). However, Elyasi et al. [45] had found no significant difference between empathy in interns and residents at MAZUMS [45]. The main reason behind this discrepancy was the profound impact of the COVID-19 pandemic on residents as compared to interns due to their greater exposure to this crisis and the livelihood problems faced by this group, of whom a higher percentage had been married. Moreover, Bangash et al. [46] had shown no significant difference in the levels of empathy between the first- and last-year medical students in Pakistan [56]. Other studies on American medical students [57] and dental students [58] as well as Chinese students [47] had further detected no significant relationship between empathy and academic years. In spite of this, some had established that empathy had increased with spending more academic years at the schools of medicine [59]. Given that empathy is a fixed personality trait that develops from childhood [46, 57, 60], it is not expected that it diminishes easily during medical school education. The present study was a cross-sectional but not a longitudinal one; therefore, it could not examine the changes in empathy over time. On the other hand, teaching empathy or communication skills is not part of the curriculum of medical students in Iran, rather it is a hidden curriculum.

Resilience

According to CD-RISC, the mean score of resilience in this study was 46.40 ± 16.40 , which is higher than the general population of China, South Korea, and the United States [30, 61, 62]. In contrast, it was similar to that measured among Australian nurses or Brazilian athletes who were living under stressful conditions on a daily basis [63, 64] as well as in earthquake survivors in China and Turkey [65, 66]. The results of the present study confirmed that the intensity of resilience in the male participants was significantly higher than that in their female counterparts, which was consistent with previous research [35]. In sum, empathy was higher in younger and native participants and among who had more educational attainment in this study.

Strengths and limitations

Investigating medical interns and residents at two universities was one of the main strengths of this study. A cross-sectional research design was also used, but the causal relationship could not be established, as it failed to observe the time-related changes in empathy and alexithymia. The data collection using a small sample size was one of the main limitations. In addition, the interns showed more willingness to cooperate than the residents

in this study. The cooperation of female participants was also more than that of males.

Suggestions

It is suggested to conduct qualitative studies on empathy in natural and real-life settings using video recordings. The other idea is to design longitudinal studies to follow up the participants during their courses at the schools of medicine and examine the variations in alexithymia, empathy, and resilience over time. It is also better to conduct phenomenological studies on the experiences of physicians and medical students and reflect on the meanings of empathy in patient care. As this study was of self-report type, further investigations with observational designs are recommended. The study findings were further obtained from the participants working at two universities of medical sciences, so their generalizability was limited. To obtain more accurate data, it is necessary to carry out more extensive research across Iran on a larger sample size. Prospective studies should be additionally developed to investigate the relationship between alexithymia, empathy, and resilience as well as their changes at different levels among medical students and physicians and explain the long-term effects of empathy and patient satisfaction, clinical outcomes, and medical errors. It is a good idea to check alexithymia, empathy, and resilience among other healthcare professionals, e.g., nurses.

Conclusion

Low empathy and resilience in medical interns and residents, especially in women who make up the majority of them, can be a warning for health care in Iran.

Abbreviations

COVID-19	Coronavirus disease 2019
SDSF	Sociodemographic survey form
JSE	The Jefferson Scale of Empathy
TAS-20	The Toronto Alexithymia Scale
CD-RISC	The Connor-Davidson Resilience Scale

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Author contributions

F. E.: contributed to the conception, drafting, language editing, and editing of the manuscript; Y.A.: did the literature search, and contributed to data gathering, statistical analyses and interpretation of data. M. Z.: contributed to the conception, language editing, and editing of the manuscript. M.M. Contributed to the statistical analyses and interpretation of data; R.H., M.V., E.M.A., F.A.A.: contributed to data gathering.

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Availability of data and materials

The data sets generated and/or analyzed during this study are available from the corresponding author upon reasonable requests.

Declarations

Ethics approval and consent to participate

Ethics Committee affiliated with Mazandaran University of Medical Sciences approved this report [Ethics Code: IR.MAZUMS.REC.1401.019]. Informed consent was obtained from all participants included in this study.

Consent for publication

Written informed consent was obtained from the participants.

Competing interests

The authors declared no competing interests in this study.

Author details

¹Sexual and Reproductive Health Research Center, Psychiatry and Behavioral Sciences Research Center, Addiction Institute, Mazandaran University of Medical Sciences, Sari, Iran. ²Student Research Committee, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran. ³Social Determinants of Health Research Center, Faculty of Medicine, Babol University of Medical Sciences, Babol, Iran. ⁴Gastrointestinal Cancer Research Center, Non-Communicable Disease Institute, Mazandaran University of Medical Sciences, Sari, Iran. ⁵Psychiatry and Behavioral Sciences Research Center, Addiction Institute, Mazandaran University of Medical Sciences, Sari, Iran. ⁶Department of Psychiatry, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran. ⁷Development Unit of Yahyanejad Hospital, Babol University of Medical Sciences, Babol, Iran. ⁸Faculty of Medicine, Babol University of Medical Sciences, Babol, Iran. ⁹Imam Khomeini General Hospital, Razi Ave., Sari 48157-33971, Mazandaran, Iran. ¹⁰Zare Hospital, Taravat Street, Neka Road, Sari 4843185774, Mazandaran, Iran.

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