


## RESEARCH ARTICLE

# One-year changes in the prevalence and positive psychological correlates of depressive symptoms during the COVID-19 pandemic among medical science students in northeast of Iran

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## Abstract

**Objectives:** The COVID-19 pandemic has imposed a significant psychological burden on many across society especially students studying medical sciences. This study intended to investigate the one-year changes in the prevalence and correlates of depressive symptoms during the COVID-19 pandemic among medical science students.

**Methods:** A cross-sectional study in Shahroud, Iran administering a convenience sampling method (January to February 2021). Online self-reported questionnaires included Rosenberg Self-Esteem Scale, Paloutzian-Ellison Spiritual Well-Being Questionnaire, Diener's Satisfaction with Life Scale and the University Student Depression Inventory. Data analyzed using descriptive and inferential statistics (Independent *t*-test and Multiple Regression Analysis).

**Results:** A total of 306 medical science students were investigated in this study. The mean scores 1 year after the outbreak of COVID-19 were for depression ( $81.25 \pm 26.04$ ), spiritual well-being ( $80.98 \pm 18.06$ ), self-esteem ( $26.89 \pm 2.20$ ), and life satisfaction ( $19.68 \pm 6.81$ ). The results indicated that depression mean score was significantly higher in post outbreak assessment ( $71.92 \pm 22.94$  vs  $81.25 \pm 26.04$ ) ( $P < .001$ ). Fifty percentage of changes in depression can be predicted by studied variables. A high score of depression was directly associated with a higher level of self-esteem. Moreover, increased interest in the field, scores of spiritual well-being, and life satisfaction were inversely and significantly associated with depression.

**Conclusions:** Iran's education system has been significantly affected, with the addition to the COVID-19 pandemic imposing a psychological burden such as depression, exacerbating this within medical science students compared to a year ago. Spiritual well-being and life satisfaction as positive psychology constructs were recognized as protective factors against depression during the pandemic. Spiritual and social support should be integrated in psychological interventions within university settings for medical science students.

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## KEYWORDS

COVID-19, depression, positive psychology, self-esteem, spirituality

## 1 | INTRODUCTION

A new strain of the coronavirus (SARS-CoV-2) was reported in Wuhan, China in late 2019. Due to rapid spread of the virus worldwide, the world was faced with a COVID-19 pandemic crisis.<sup>1</sup> Many countries imposed travel restrictions and other measures in response to the COVID-19 outbreak in order to reduce COVID-19 transmission and infection (such as being required to observe the social distance, quarantine, telecommuting, and studying at home).<sup>2</sup> The emerge of COVID-19 around the world has affected the mental health aspects of communities and imposed a heavy psychological burden, resulting in public psychological distress with a detrimental effect on psychological well-being and a rise in psychological symptoms in the general population in Iran and other countries,<sup>3-5</sup> negatively impacting on physical health<sup>6</sup> and social well-being.<sup>7,8</sup> According to a literature review people in quarantine reported depression, anxiety, stress, and irritability during the COVID-19 pandemic.<sup>9-11</sup>

The lockdown policy implemented after COVID-19 pandemic such as closure and change of policy of educational and evolving the approach of virtual and online education instead of face-to-face education has brought new challenges in teaching and learning strategies<sup>12</sup> which has been associated with psychological consequences.<sup>13</sup>

One of the most prevalent psychological problems resulting from social isolation and quarantine following COVID-19 pandemic is depression, which has been studied in different communities especially in Iranian general population, that has a high prevalence.<sup>14</sup> Some groups (such as college students) are known to be at high risk for mental health problems. According to Halperin et al,<sup>15</sup> 24.3% of medical students in the United States experienced depression during the corona epidemic. The prevalence of this condition among medical students in Iran is estimated to be 27.6%.<sup>16</sup> Depression in medical sciences students can manifest as slowed thinking, difficulty concentrating, feelings of inadequacy<sup>17</sup> anxiety and suicidal ideation,<sup>18</sup> all of which have negative consequences for academic satisfaction, and academic achievement.<sup>19</sup> Moreover, they may be suffering from other psychological problems, such as anxiety, burnout, suicidal ideation, and substance abuse.<sup>20</sup>

There is a growing literature investigating the correlates of psychological burden among medical sciences students. It is suggested that well-being promotion can play an important role to alleviate the problem.<sup>21</sup> Furthermore, during the COVID-19 pandemic, spiritual well-being is one of the protective factors against a variety of psychological distress, such as anxiety and particularly depression.<sup>22</sup> Spirituality is defined as “a dynamic aspect of humanity through which individuals seek meaning, purpose, and relationships with themselves, their families, others, and society.” Spiritual well-being is defined as an intrinsic and dynamic aspect of human's health and spiritual maturity, which emphasizes both religious and existential dimension.<sup>23</sup> In other words, spiritual well-being, along with spiritual practices, is seen as an important component in almost all cultures. In fact, spiritual well-being helps people cope with stressful life

events<sup>24</sup> and deal with depression.<sup>25</sup> In this regard, the results of studies indicate low level of spiritual well-being is associated with higher levels of fear to COVID-19 and disturbed sense of the meaning and purpose of life, and lower level of life satisfaction in individuals who have experienced COVID-19 disease.<sup>26,27</sup>

In general, various factors are involved in exacerbating or alleviating depressive symptoms, including positive psychological constructs (hope, optimism, life satisfaction, self-efficacy, self-esteem, meaning of life, mindfulness). Positive psychological constructs have a significant and inverse relationship with negative mental health outcomes such as depression.<sup>28</sup>

The Positive Psychology Framework is appropriate for addressing the mental health of medical science students because of its emphasis on individual strengths, positive aspects of life, and satisfaction.<sup>29</sup> Positive psychology is the scientific study of pleasurable experiences and positive personal characteristics (as human strengths as a protector against mental disorders).<sup>30</sup> Positive psychology is a useful framework for understanding students' academic achievement, mental health, and career advancement. When researchers use a positive psychological framework to understand the factors that predict important outcomes, researchers can identify appropriate interventions to target those factors that contribute to academic achievement or mental health. Positive psychology focuses on those strategies that enhance happiness, positive emotions, and well-being. Other important areas of positive psychology deal with how to process past experiences, create positive feelings about the present, recognize and use strengths, and grow hope and optimism toward the future.<sup>30</sup>

Life satisfaction as one of the constructs of positive psychology is one of the predictors of depression in medical science students so that lower life satisfaction is associated with more severe symptoms of depression.<sup>31</sup> According to Diener,<sup>32</sup> life satisfaction can be defined as the feeling of satisfaction with the whole-of-life. The results of studies show that higher life satisfaction is associated with greater happiness and resilience in students.<sup>33</sup> According to the findings of studies conducted during the COVID-19 pandemic, higher levels of life satisfaction, meaning in life, and hope were also significantly associated with lower levels of anxiety and stress caused by COVID-19 and deteriorated health status.<sup>34,35</sup>

Self-esteem as another construct of positive psychology, according to Rosenberg,<sup>36</sup> is defined as the favorable or unfavorable attitude that people have toward themselves, which is one of the preventive and protective factors against depression. Lower levels of self-esteem play a crucial role in the development of depressive symptoms, and in studies of the etiology of depression, low self-esteem is a known factor, based on the vulnerability model have confirmed this finding.<sup>37</sup> Therefore, higher levels of self-esteem can act as a protective factor and decrease depressive symptomatology, which has been confirmed by Rossi et al.<sup>38</sup> Participants that had a higher level of self-esteem during COVID-19 acted as a protective factor, decreasing the impact of the pandemic, specially

decreasing the development, and maintenance of depressive symptomology.

Since the COVID-19 pandemic has intensified the imposition of psychological burden and distress on medical science students, it is imperative to investigate the psychological distress within medical science students, in addition to determining the effect of the COVID-19 pandemic on the prevalence of depression. Despite of previous research on the issue, there is lack of knowledge on the relationship between the prevalence of depression among medical sciences students with spiritual well-being and positive psychology constructs (including satisfaction with life and self-esteem). This study aims to investigate the consequences of the COVID-19 pandemic on changes in the prevalence of depression, and its relationship with spiritual well-being, life satisfaction, and self-esteem among Shahroud University of Medical Sciences medical science students in 2021.

## 2 | MATERIALS AND METHODS

### 2.1 | Research design and participants

This online cross-sectional survey was performed to compare the prevalence of depression within a year, before (January 20 to February 19, 2020) and during the COVID-19 pandemic (from January 7 to February 7, 2021) among the medical sciences students of Shahroud University of Medical Science, Iran. Sampling of the present study was performed after passing the third wave of COVID-19 in Iran which was the largest wave with the highest incidence and mortality than previous waves in Iran. The participants were college students in nursing, medicine, surgical technology, environmental health, radiology, laboratory sciences, midwifery, and anesthesia fields. The present study's sample size was estimated to be 282 students according to Rezaejad et al<sup>39</sup> study with  $\alpha = 10\%$ , and power = 85%. Predicting a probable withdrawal rate of 10%, 310 students were finally included. The following standard formula was used to calculate the sample size.

$$n = \frac{z^2 * (p * 1 - p)}{d^2}$$

Results related to the prevalence of depression and the related factors before the outbreak have been reported elsewhere.<sup>19</sup> The second phase of the study was performed 1 year after the outbreak of COVID-19. In addition, the prevalence of depression, some variables as possible related factors related to depression were measured such as self-esteem, life satisfaction, and spiritual well-being. Out of 310 forms, 306 students filled the form completely (the four uncompleted forms were excluded from the study) (Figure 1).

### 2.2 | Inclusion criteria

The inclusion criteria of the study were defined as aged 18 and over, access to the internet and cyberspace, no known psychiatric

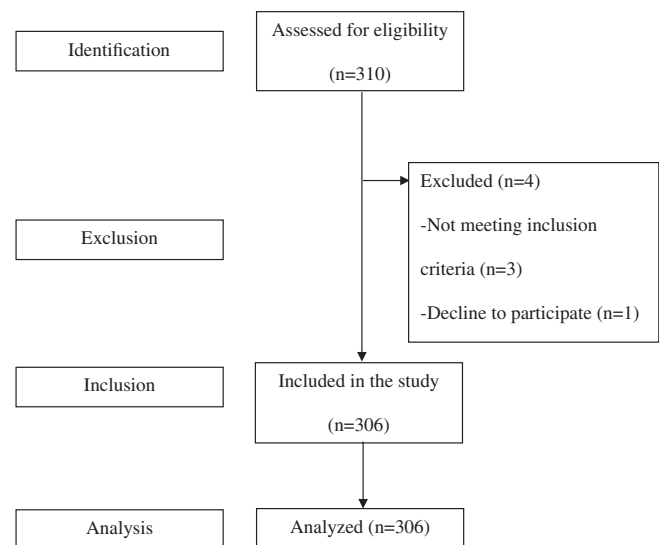


FIGURE 1 STROBE flow diagram

disorders, and use of neuroleptic medications. Eligible participants were selected by the convenient sampling method.

### 2.3 | Sampling method

In order to better access the participants and prevent the spread of the disease, the participants were invited to participate in the study by sending invitation messages via WhatsApp and Telegram (two popular chat applications in Iran) by convenience sampling method. Access to students was possible through online class groups on mentioned social networks. The demographic characteristics, depression, life satisfaction, spiritual well-being, and self-esteem were measured by using online self-reported questionnaires in Porsline platform (<https://porsline.ir/>) which provides online questionnaire in local language (Persian).

The demographic form includes items such as age, sex, marital status, residential status (dormitory, rented or private house), passed university semester, grade point average (GPA) of the previous semester, and interest in the field of study (A scoring range of 0-10, a higher score indicates more interest). In addition, economic status, educational status, daily follow-up of COVID-19 news, history of COVID-19 infection and history of infection or death of relatives due to COVID-19 were assessed.

### 2.4 | Measurements

University Student Depression Inventory (USDI; Khawaja and Bryden<sup>40</sup>) was implemented to assess depression based on each participants score. Since the previous study used the USDI tool,<sup>19</sup> this questionnaire was used in the present study to compare the conditions more accurately in terms of one-year changes in depression and the same measurement scales in the two time periods. This questionnaire

consists of 30 questions in three subscales which are lethargy, cognitive-emotional, and academic motivation. Each question is scored from 1 to 5, respectively (strongly disagree = 1 and strongly agree = 5). The lower and higher score was between 30 and 150, respectively. Higher scores indicate a higher level of depression.<sup>40</sup> The Persian version of the USDI was validated in terms of content, concurrent, divergent, predictive, discriminated, and construct validity. They reported the Cronbach's alpha of 0.93 and test-retest of 0.86.<sup>41</sup>

*The Satisfaction with Life Scale (SWLS; Diener et al<sup>42</sup>)* was applied to assess participants' satisfaction with life and consists of five questions. The minimum and maximum scores can be 5 and 35, respectively (strongly disagree = 1 and strongly agree = 7). A higher score indicates more life satisfaction.<sup>42</sup> Bayani et al<sup>43</sup> confirmed its validity in Iranian culture and reported Cronbach's alpha equal to 0.83.

*Spiritual Well-Being Questionnaire (Paloutzian and Ellison<sup>44</sup>)* Participants' were evaluated regarding their spiritual well-being, by being asked 20 questions in which each item is rated on a six-point Likert scale (strongly disagree = 1 and strongly agree = 6). The possible

score range was between 20 and 120. Half of the questions are about religious well-being and the other half are about existential well-being. The total score of spiritual well-being is the sum of the scores of these two subscales. Moreover, the spiritual well-being of individuals is divided into three categories based on the obtained score: low (20-40), medium (41-99) and high (100-120).<sup>44</sup> Cronbach's alpha reported by Papazisis et al<sup>45</sup> for religious, existential, and overall scale were 0.91, 0.91, and 0.93. The Persian version of the scale was

**TABLE 2** Mean scores of spiritual well-being and its subscales, life satisfaction and self-esteem 1 year after COVID-19 outbreak in medical science students

Variables	Mean	SD
Spiritual well-being	80.98	18.06
Religious well-being	42.31	10.70
Existential well-being	38.66	9.13
Life satisfaction	19.68	6.81
Self esteem	26.89	2.20

**TABLE 1** The demographic characteristics of medical science students

Variable		n	%
Gender	Female	201	65.7
	Male	105	34.3
Marital status	Married	18	5.9
	Single	288	94.1
Housing	Student dormitory	200	65.4
	Rental	30	9.8
	Personal	76	24.8
Field of study	Surgical technology	34	11.1
	Environmental health	47	15.4
	Radiology	9	2.9
	Nursing	100	32.7
	Medicine	45	14.7
	Laboratory science	15	4.9
	Midwifery	36	11.8
History of COVID-19 infection	Yes	32	10.5
	No	274	89.5
COVID-19 infection in relatives	Yes	152	49.7
	No	154	50.3
Death of relatives by COVID-19	Yes	28	9.2
	No	278	90.8
		<b>Mean</b>	<b>SD</b>
Age (per year)		21.62	3.06
The grade point average (GPA)		16.50	1.45
Interest in field		7.25	2.41
Daily follow-up on COVID-19 news (per hours)		1.12	0.86

Abbreviations: %, percent; N, number; SD, standard deviation.

confirmed in 2019. The Cronbach's alpha coefficient in Iranian medical science students in the dimensions of religious well-being was 0.84, existential well-being was 0.70 and for spiritual well-being was 0.90, which indicates the acceptable validity and reliability of the instrument in Iranian culture.<sup>46</sup>

The *Rosenberg Self-Esteem Scale (RSE; Rosenberg<sup>47</sup>)* is used to assess participants' self-esteem. It consists of 10 questions that are answered on a four-point Likert scale from strongly agree to strongly disagree. The range of scores that can be obtained from this questionnaire was 10 to 40, and higher scores indicate higher self-esteem. The Cronbach's alpha coefficient for the original version of this scale is estimated at 74%.<sup>47</sup> The reliability of the Persian version of the scale was calculated with Cronbach's alpha of 0.80.<sup>48</sup>

## 2.5 | Statistical analysis

Data analysis was performed with descriptive (frequency, mean, and SDs) and inferential statistics such as Independent t-test (To compare the scores of depression before and during the COVID-19 pandemic) and Multiple Regression Analysis (To determine the predictors of depression score during the COVID-19 pandemic), with significance level set at  $P < .05$ .

## 2.6 | Ethical considerations

This study was approved by the Ethics Committee of Shahrood University of Medical Sciences (Ethical approval code: IR.SHMU.REC.1399.104). Research objectives, confidentiality, potential risks, and benefits were provided to potential participants on the online platform. Online informed consent was obtained from all participants prior to completing the online questionnaires. Researchers' contact details were provided if participants would like to ask any questions or to withdraw.

## 3 | RESULTS

The results of the present study showed that most of the participants were female (65.7%), third semester student (22.2%), single (94.1%), nurse student (32.7%), and resident in dormitory (65.4%). The majority

of the participants were studying at the undergraduate level (85.3%) and most of them had average economic status (77.5%). About one-tenth of students reported a history of COVID-19 (10.5%), and about half of their relatives had a history of COVID-19 (49.7%). The mean GPA, interest in the field, and age were  $16.50 \pm 1.45$ ,  $7.25 \pm 2.41$ , and  $21.62 \pm 3.06$ . Additional results are available in Table 1.

Regarding the subjects' experience of COVID-19, about 10% reported a positive history of COVID-19 for themselves and 15% of them lived with a family member who experienced COVID-19 infection. Furthermore, about 10% of their relatives died of COVID-19. The mean daily follow-up hours of COVID-19 news in students was reported as  $0.75 \pm 0.59$ .

The results of the study indicated that the mean score of spiritual well-being, life satisfaction, and self-esteem in medical science students were  $80.98 \pm 18.06$ ,  $19.68 \pm 6.81$ , and  $26.89 \pm 2.20$ . The detailed results are listed in Table 2.

According to the results of Table 3 (showing the independent t-test significance, means and SDs), the mean total score of depression and its subscales (lethargy, cognitive-emotional and academic motivation) during COVID-19 pandemic were  $81.25 \pm 26.04$ ,  $26.38 \pm 9.05$ ,  $13.26 \pm 4.92$ , and  $13.38 \pm 41.60$ . Comparing the participants' scores before and after COVID-19 pandemic, the results of the study indicated a significant increase in their depression scores. Moreover, the backward multiple regression analysis showed that 50% of the variance in students' depression score was explained by the variables within the model. The regression model showed that for each unit of interest in the field of study, satisfaction with life, and spiritual well-being, the depression mean score decreases by 0.948, 1.505, and 0.472 units. The regression model also showed that for each unit of increase in self-esteem score, the depression mean score increased by 1.96 units. The detailed results are summarized in Table 4.

**TABLE 4** The role of independent variables on depression 1 year after COVID-19 outbreak in medical science students

Variables	$\beta$	SE	T	P-value
Constant value	103.150	14.169	7.280	<.001
Interest in field	-0.948	0.475	-1.998	.047
Life satisfaction	-1.505	0.197	-7.653	<.001
Spiritual well-being	-0.472	0.072	-6.563	<.001
Self esteem	1.964	0.487	4.031	<.001

**TABLE 3** Mean scores of depression and its subscales before and 1 year after COVID-19 outbreak

Variables	Before		After		t	P-value <sup>a</sup>
	Mean	SD	Mean	SD		
Depression	71.92	22.94	81.25	26.04	-4.72	<.001
Lethargy	22.21	7.98	26.38	9.05	-6.07	<.001
Cognitive-emotional	12.27	4.45	13.26	4.92	-2.61	.009
Academic motivation	37.42	12.00	41.60	13.38	-4.08	<.001

<sup>a</sup>: Independent t-test.

Abbreviation: SD, standard deviation.

## 4 | DISCUSSION

COVID-19 has significantly impacted on mental health, more so within communities in Iran and other Asian countries,<sup>49-52</sup> as well as educational structures within university institutions.<sup>53</sup> The sudden shift to exclusive e-learning methods instead of teaching, has resulted in university students experiencing depression.<sup>54</sup> In this regard, this study dealt with a critical issue of depression among medical science students, comparing study outcomes before and during COVID-19. According to the results of the present study, the mean score of depression and its subscales have significantly increased 1 year after COVID-19. Consistent with this finding, several longitudinal studies have shown that mental health status has deteriorated during COVID-19,<sup>8,55,56</sup> including suicidal ideation.<sup>57</sup> Many studies have been conducted to investigate the effect of COVID-19 on various aspects of mental health in different communities. For example, Pierce et al<sup>58</sup> showed an increase in mental health severity in April 2020 compared to pre-COVID-19 and similarly Meda et al<sup>59</sup> found that 6 months after COVID-19 in Italy, students experienced exacerbations of depressive symptoms.

The possible reasons for changes in students' mental health status may be rooted in the fact that the usual method of the educational system in assigning homework and taking exams, had fundamental changes, and during these changes students were faced with conflicting information.<sup>60</sup> This contributed to feelings of confusion and uncertainty that affected their mental health.<sup>61</sup>

According to the findings of the present study, spiritual well-being as one of the predictor variables of depression has a significant and inverse relationship. In line with this finding, the results of Lee et al<sup>62</sup> investigated the effect of spirituality on depression and psychological well-being in students and showed that spiritual well-being has an inverse and significant relationship with depression in undergraduate students. Moreover, Alorani and Alradaydeh<sup>63</sup> showed that there is a significant negative relationship between spiritual well-being and both of depression and aggression. In the critical situation created by COVID-19, spirituality can be a source for the development of a new sense of meaning and purpose in people's lives. At the same time, people can protect their psychological health and face their psychological distress during this period, in a positive way by a positive approach in emotion-based stress coping strategy.

The present study found that self-esteem had a direct and significant relationship with depression. However, the results of most studies indicate an inverse relationship between these two variables, for example, the results of the study Sakellari et al<sup>64</sup> showed that higher self-esteem in university students is associated with lower levels of depression. Inconsistent with results of current study, Rossi et al<sup>38</sup> showed that self-esteem has a buffering-effect of on the relationships between negative psychological distress such as a fear of COVID-19, dispositional loneliness feelings, anxiety, and depression during the COVID-19 pandemic.

There are several possible justifications for this finding. One possible reason could be that the students in the study may have experienced "Pseudo-self-esteem" or "Excessive self-esteem," which is not true and has led to increased depression. According to Makowski,<sup>65</sup>

those with pseudo-self-esteem are prone to emotional distress. Another possible reason is that students have more access to social media during the COVID-19 pandemic to attend classes and do their homework. The results of Donchi and Moore study (2004) showed that self-esteem has a positive relationship with social media use.<sup>66</sup> Also media exposure may play when people try to learn more about traumatic events such as COVID-19, may experience stress reduction because it acts as a coping strategy to reduce psychological stress. Therefore, media coverage in disasters may play an important role in improvement of people's mental health.<sup>67</sup> In this regard, the results of Trifiro's study (2018) show that people who used the social network Instagram more, showed higher levels of self-esteem and well-being.<sup>68</sup> Other possible reasons include differences in personality types and the presence of narcissistic personality type.

The results of the present study showed that depression had a significant and inverse relationship with life satisfaction in the subjects. Consistent with this result, Seo et al<sup>69</sup> showed that life satisfaction and happiness are associated with lower risk of depression in students and are significantly and inversely related to each other. Life satisfaction during COVID-19 was inversely related to psychological distress such as anxiety.<sup>34</sup> A possible reason for this, is the delivery of all lectures and seminars were accessed remotely online during lockdown. Depending on this mode of learning, may have encouraged students to rely more on using their tablet or laptop as a result of this, increasing their time spent on their devices. While the students must stay at home in isolation, quarantine, and away from friendly gatherings, they have become more exposed to the negative influence of cyberspace, such as mobile phone addiction, the internet, and social networks, which may predispose them to reduced life satisfaction. In other words, quarantine and loneliness due to COVID-19 lead to decreased life satisfaction, which in turn can exacerbate depression. Tian et al<sup>70</sup> postulated that loneliness and depression are the main mechanisms that cause life satisfaction to be affected by online shopping, use of pornography, social networks, and online games in students.

The results of the current study showed that depression during the COVID-19 pandemic was significantly and inversely related to interest in their field of study. Findings from studies prior to COVID-19 also confirmed such findings in medical science students.<sup>19</sup> Feeling sad and grief in line with depression eventually leads to a loss of interest in activities that were previously important.<sup>71</sup> On the other hand, an individual's lack of interest in the field of study, in the long run may will affect their academic satisfaction, as well triggering depressive symptoms and maintaining low levels of motivation. In this regard, it can be considered to use mental health promotion strategies during the COVID-19, such as internet based cognitive-behavioral therapies (CBT) or online psychoeducational supports.<sup>72,73</sup>

The results of the present study showed that depression during the COVID-19 pandemic significantly increased within 1 year period before and during COVID-19 pandemic. Spiritual well-being, life satisfaction, and self-esteem are significantly associated with perceived depression during COVID-19.

The participation of medical students in the prevention and control of COVID-19 complications, such as mental health problems, has

certain benefits. With a solid background in the field of health care that has developed over the years through in-depth training, senior medical students have sufficient practical and clinical capabilities. In addition, medical science students (such as psychiatric nursing and psychology) are trained in effective interpersonal communication, understanding, and treating serious disorders, and ethical dilemmas that are useful in investigating and resolving these problems.<sup>74</sup> Therefore, using this capacity against the negative consequences of COVID-19 is recommended.

Due to the impact of depression in various aspects of medical science students' lives, simply improving the level of education and educational status in this group is not effective. Based on this, it is suggested that due to the forced change of lifestyles during COVID-19, accurate and expert counseling by experts in the field of medical sciences and strengthening of spiritual and social support and strategies to identify and prevent the causes. In addition to referring students with severe levels of depression to the Mental Health Counseling Office for mentioned supports, there is a regular program at the university for students who are experiencing academic failure to be followed up by counselors. If an academic failure occurs or persists, they will be referred to the Mental Health and education Counseling office.

## 5 | LIMITATION

The two stages of the present study were cross-sectional and there was a long-time interval between the two stages. Future studies of COVID-19 need to be performed at broader levels and at shorter intervals for more detailed longitudinal examination with larger sample sizes. This study was conducted online for faster conclusions and increasing access for participation. Items such as personality types, personality disorders, and other positive and negative aspects of mental health (such as hope, optimism, stress, anxiety, etc) were not evaluated due to the increase in the number of questionnaires and the decrease in the rate of answering questions. So further exploration is needed to discuss further as the questionnaires are limited and closed questions and should conduct a functional neuroimaging to assess and diagnose the depression and a qualitative semi-structured interview to provide insight in how depression, spirituality, self-esteem, and life satisfaction has been impacted because of the COVID-19 pandemic.<sup>75</sup>

## 6 | CONCLUSION

This study has shown the psychological burden that has been triggered by the COVID-19 pandemic within medical students. Depression has been exacerbated compared to 12 months previous, prior to the onset of the pandemic, which is consistent within existing literature.

It is vitally important that the findings from this study are applied within university settings, to help maintain well-being and to decrease

psychological distress, especially post COVID. The psychological support should have the addition of spiritual well-being and social support integrated into a unified intervention.

The findings from the study cannot be generalized to larger communities, so to investigate the broader aspects of mental health in medical science students during the COVID pandemic, it is recommended to conduct further research. For example, from a qualitative exploration stance of the impact of post COVID pandemic and the everlasting impact of the significant changes in the delivery of medical education, as well as the psychological impact on the medical science students. At the time of the study, vaccination had not been performed on participants, so it is recommended that future studies examine various aspects of mental health in medical science students with respect to vaccination.

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## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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Hossein Ebrahimi had full access to all the data in the study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

## TRANSPARENCY STATEMENT

Hossein Ebrahimi affirms that this manuscript is an honest, accurate, and transparent account of the study being reported and all aspects of the study have been reported.

## DATA AVAILABILITY STATEMENT

If interested in obtaining the data from this study please contact ebrahimi@shmu.ac.ir.

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