RESEARCH

Level and predictors of mental health literacy of depression and suicide among undergraduate medical students

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Abstract

Background: Poor mental health literacy (MHL) is considered a significant barrier to medical students seeking treatment for depression and suicide. This study aimed to assess the level of mental health literacy of depression and suicide among undergraduate medical students as well as to determine its predictors. An online survey was conducted on 361 undergraduate medical students through the Microsoft Team platform using a Google form application-structured questionnaire that included a sociodemographic section, the depression literacy scale (D-Lit), and the modified suicide literacy scale (LOSS).

Results: The mean D-Lit score was 7.9 ± 1.8 (total score ranged from 0 to 22), while the mean LOSS score was 4.5 ± 1.7 (total score ranged from 0 to 12). Only 36.8% of students had depression literacy levels higher than the mean depression score, whereas 28.8% had a suicide literacy level exceeding the mean suicide score. A statistically significant positive correlation was revealed between the mean score of depression literacy and that of suicide literacy ($r = 0.16$, p-value $= 0.002$). Male gender ($p < 0.05$), family history of depression ($p < 0.05$), and history of suicidal ideations ($p < 0.01$) are all predictors of higher depression literacy scores.

Conclusions: According to the results, there is compelling evidence that depression and suicide literacy among medical students was low. Therefore, rather than waiting until a medical student reaches the clinical years, mental health education should be introduced early in medical school curricula or even in high school.

Keywords: Medical students, Depression, Suicide, Literacy, Predictors, Egypt

Background

According to the World Health Organization (WHO), approximately 450 million individuals have mental disorders and even more than mental health issues. The prevalence of mental disorders appears to increase, accounting for approximately 13% of the global disease burden. Currently, depression is one of the most prevalent mental disorders worldwide [1].

Undergraduate medical students are more susceptible to burnout syndrome due to the high incidence of stress during their academic study period and in their clinical practice as physicians [2]. Medical students are exposed to various academic, clinical, personal, financial, and social stressors [3]. It has been reported that medical students experience stress more than nonmedical students [4, 5]. Chronic stress is associated with higher rates of depression. Therefore, depression is documented as the most common mental disorder among medical students [6]. Furthermore, medical students are at a higher risk of suicide than other academic groups due to their elevated risk of depression [7].

MHL has been defined as follows: "understanding how to obtain and maintain positive mental health;

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understanding mental disorders and their treatments; decreasing stigma related to mental disorders, and enhancing help-seeking efficacy (knowing when and where to seek help and developing competencies designed to improve one's mental health care and self-management capabilities)" [8]. Poor MHL is considered a significant barrier to medical students seeking treatment for depression and suicide. Although several studies on MHL are being conducted in Western countries, there is a scarcity of research studies on MHL in Arab countries. Consequently, this study aimed to assess the level of MHL of depression and suicide among undergraduate medical students and to determine its predictors.

Methods
Study design and setting
A cross-sectional study was conducted from March to May 2022 at the Faculty of Medicine, Zagazig University, Sharkia Governorate, Egypt, using an online survey. Zagazig University has two parallel MBBCH programs: the new competency-based program that includes the medical students from 1st, 2nd, 3rd, and 4th years and the traditional program that includes the medical students from 5th and 6th years.

Study subjects
The study targeted undergraduate medical students in the new competency-based MBBCH program. Each academic year has around one-thousand students; one-third are international students, with Palestinian, Syrian, and Sudanese nationalities equally represented. All these students have accounts on the Microsoft Team platform, an official platform used for formal and informal communication between students and staff, as well as online learning classes.

OpenEpi was used to calculate the sample size based on the following data: the total number of faculty students is 6450. The percentage of students with satisfactory MHL was 50% in a previous study [9], with 5% confidence limits and a design effect of 1 at a confidence level of 95%. The calculated sample size was 361 participants. The researchers communicated with the e-learning unit to obtain permission to share the online questionnaire through the students' teams on the Microsoft Team platform. The questionnaire was created using Google Form App, and the link was distributed to the student teams. When the sample size was reached, we stopped accepting completed questionnaires, considering the proportional allocation of domestic to international students, which is represented by a 2:1 ratio. It means that for every two completed questionnaires from Egyptian students, we included one completed questionnaire from international students of different nationalities considering the

equal distribution of all representative nationalities in the study.

Inclusion and exclusion criteria
Students who had completed a minimum of 1 year in medical school and filled out the questionnaire were included.

In May 2022, 10% of the sample (36 students) from various Arab countries participated in an online survey as part of the pilot study, which contributed to the following:

(1) Determining the language of the questionnaire, which was administrated in English and Arabic versions. Most students chose to answer the Arabic version, and even the few who responded to the English version did so without responding to many questions and remarking that many words were difficult to understand.
(2) Validating the cultural appropriateness of the questionnaire. Each item in the questionnaire was evaluated by every participant for clarity of content and structure. Every participant was asked to read the questions and response options precisely as they appear in the questionnaire before responding to the following cognitive probing questions: (a) did you need to ask for clarification on any question? (b) Did you have any difficulty using the response options? (c) Was there any word you did not understand? These questions were represented in a table with answers of yes, no, and comment.
(3) Testing the feasibility and applicability of the study. According to the result of the pilot study, the Arabic version of the questionnaire was selected with minor modifications. The pilot results were not included in the study's findings.

Data collection tool
An Arabic, self-administered, online questionnaire consisted of the following parts:

- Part 1: A brief introduction to the aim and procedures of the study, voluntary nature of participation, declarations of confidentiality, and exclusion criteria
- Part 2: Sociodemographic characteristics, including age, gender, nationality, and year of study
- Part 3: Depression literacy scale (D-Lit)—Arabic version was adapted from Darraj et al. [10]. It is a valid and reliable tool for assessing MHL specific to depression [10]. It includes 22 items about depression symptoms (11 items), impact (3 items), and management (8 items). Respondents answered

each item with one of three options: true, false, or do not know. Correct responses were given a score of 1, while incorrect responses and the do not know option were scored 0. The total score ranged from 0 to 22. A higher score indicates a higher depression literacy. Additonally, the students who achieved a total score above the mean total score for all students were counted and considered to achieve a high depression literacy score.

- Part 4: Literacy of suicide scale (LOSS)—short form was adapted from Calear et al. in 2012 [11]. It underwent translation and cultural adaptation depending on the WHO guidelines adapted from Younan et al. [12]. This process passed through two phases:

  - Phase 1: Forward translation, expert committee approval, and back translation. First, the questionnaire was translated into Arabic by the first author, who is a bilingual (Arabic/English) expert. Second, a bilingual expert committee that included a translator, a social expert, and a psychiatrist was asked to review and correct the draft version of the LOSS. Third, the modified version by the expert committee was translated back into English by an independent bilingual academic who is experienced at translating measurement scales into English but had no prior knowledge of the LOSS. Additionally, the committee evaluated the instrument's eligibility for use with adolescents and deemed it acceptable. In order to avoid any limitations on the applicability of this version, the final translation was done in standard Arabic, which can be used in other Arab countries with different dialects.
  - Phase 2: Cultural validation was done through a pilot study (as discussed above). It consists of 12 items measuring knowledge about suicide: signs and symptoms (three items), causes/nature of suicide (three items), risk factors (three items), and treatment and prevention (two items). Respondents answered each item with one of three options: true, false, and do not know. Correct responses were given a score of 1, while incorrect responses and the do not know option were scored 0. Literacy scores were the sum of all correctly identified items. The total score ranged from 0 to 12. A higher score indicates a higher suicide literacy. In addition, the students who achieved a total score greater than the mean total score for all students were counted and considered to achieve a high suicide literacy score.

Table 1 Sociodemographic characteristics, medical, mental, and family histories of studied medical students

Characteristics	Frequency (%) ($N =$ 361)
Age	
Mean ± SD	21.4 ± 0.8
Range	19–24
Sex	
Female	236 (65.4)
Male	125 (34.6)
Nationality	
Egyptians	227 (62.9)
Non-Egyptians[a]	134 (37.1)
Religion	
Muslims	361 (100)
Residence	
Rural	154 (42.7)
Urban	207 (57.3)
Social class	
Low	4 (0.9)
Middle	333 (92.5)
High	24 (6.6)
Study grade	
2nd	25 (7.0)
3rd	151 (41.8)
4th	185 (51.2)
Medical history of chronic diseases	46 (12.7)
History of regular treatment	42 (11.6)
Personal history of psychiatric illness	32 (8.9)
History of suicidal ideations	45 (12.5)
Parents live	
Together	323 (89.5)
Separated	38 (10.5)
Family history of depression	49 (13.6)
Family history of suicidal attempts	25 (6.9)
Family history of consulting psychiatrist	74 (20.5)
Previously training on mental health	95 (26.3)

[a] Non-Egyptians (Palestinians, Syrians, Sudanese)

Statistical analysis

Data were analyzed using SPSS Statistics 15 (SPSS 15.0). Descriptive statistics were used to express sociodemographic and clinical characteristics. The distribution and normality of the sample were assessed with the Kolmogorov-Smirnov test. The appropriate statistical tests such as the student *t*-test and Mann-Whitney *U*-test were used to express the group difference for clinical variables on the scores of different scales (for comparison of two groups), and the ANOVA test and Kruskal-Wallis test were used for comparing multiple groups. Pearson correlation was

used to measure the linear correlation between data. Binary logistic regression analysis was used to define predictors of literacy.

Results

Table 1 demonstrates the characteristics of the studied undergraduate medical students, with age distribution ranging from 19 to 24 years, where the mean age was (21.4 ± 0.8 years). In addition, 65.4% were females, 37.1% were non-Egyptians, all were Muslims, 57.3% were from urban areas, 92.5% were of middle social class, and the majority were from the 3rd and 4th academic years. Regarding their medical history, 12.7% had a history of chronic diseases, and 11.6% had a history of regular treatment. Regarding their mental history, 8.9% had a history of psychiatric illness, and 12.5% had a history of suicide ideations. Regarding their family history, they were positive for depression, suicide attempts, and a history of consulting psychiatrists in 13.6%, 6.9%, and 20.5%, respectively, and 10.5% of them lived with separate parents. Only 26.3% had previous training in mental health.

Table 2 describes the participants' literacy about depression, with the majority identifying the physical symptoms (affection for eating and sleep) and only three psychiatric symptoms (feeling guilty, loss of self-confidence, psychomotor retardation/agitation). Regarding their literacy about the impact of depression, none of them recorded the need for depressed patients to be hospitalized, most of them reported the affection of many famous people with depression, and only 35% of them reported that moderate depression disrupts a person's life as much as multiple sclerosis or deafness. Regarding their literacy about managing depression, none of the participants could provide the correct answers about the different management lines.

Table 3 describes the participants' literacy about suicide. A large percentage of participants (82.9%) correctly perceived that visiting a psychiatrist or psychologist can help prevent someone from suicide. A significant proportion of participants correctly perceived that people who have thoughts about suicide should tell others about it, and a suicidal person will not always be suicidal and entertain thoughts of suicide. A small percentage of participants correctly perceived other signs and symptoms, causes/nature of suicide, risk factors, and treatment and prevention.

Table 4 shows that the mean depression literacy score was 7.9 ± 1.8, while the mean suicide literacy score was 4.5 ± 1.7. Only 36.8% of students had a depression literacy level above the mean depression score, and only

Table 2 Frequency distribution of correct answers to the depression literacy scale

Items	Frequency of correct answers (%)
1. People with depression often speak in a rambling and disjointed way	118 (32.6)
2. People with depression may feel guilty when they are not at fault	312 (86.4)
3. Reckless and foolhardy behavior is a common sign of depression	86 (23.8)
4. Loss of confidence and poor self-esteem may be a symptom of depression	342 (94.7)
5. Not stepping on cracks in the footpath may be a sign of depression	99 (27.4)
6. People with depression often hear voices that are not there	145 (40.2)
7. Sleeping too much or too little may be a sign of depression	349 (96.7)
8. Eating too much or losing interest in food may be a sign of depression	347 (96.1)
9. Depression does not affect your memory and concentration	0 (0.0)
10. Having several distinct personalities may be a sign of depression	0 (0.0)
11. People may move more slowly or become agitated as a result of their depression	319 (88.4)
12. Clinical psychologists can prescribe antidepressants	0 (0.0)
13. Moderate depression disrupts a person's life as much as multiple sclerosis or deafness	129 (35.7)
14. Most people with depression need to be hospitalized	0 (0.0)
15. Many famous people have suffered from depression	324 (89.8)
16. Many treatments for depression are more effective than antidepressants	0 (0.0)
17. Counselling is as effective as cognitive behavioral therapy for depression	0 (0.0)
18. Cognitive behavioral therapy is as effective as antidepressants for mild to moderate depression	0 (0.0)
19. Of all the alternative and lifestyle treatments for depression, vitamins are likely to be the most helpful	0 (0.0)
20. People with depression should stop taking antidepressants as soon as they feel better	0 (0.0)
21. Antidepressants are addictive	0 (0.0)
22. Antidepressant medications usually work straightaway	0 (0.0)

Table 3 Frequency distribution of correct answers to the suicide literacy scale

Items	Frequency of correct answers (%)
1. If assessed by a psychiatrist, everyone who suicides would be diagnosed as depressed"	46 (12.7)
2. Seeing a psychiatrist or psychologist can help prevent someone from suicide"	335 (82.9)
3. Most people who suicide are psychotic	116 (32.1)
4. There is a strong relationship between alcoholism and suicide	18 (5.0)
5. People who talk about suicide rarely kill themselves	152 (42.1)
6. People who want to attempt suicide can change their mind quickly	163 (45.2)
7. Talking about suicide always increases the risk of suicide	57 (15.8)
8. Not all people who attempt suicide plan their attempt in advance	52 (14.4)
9. People who have thoughts about suicide should not tell others about it"	246 (68.1)
10. Very few people have thoughts about suicide"	59 (16.3)
11. Men are more likely to suicide than women	147 (40.7)
12. A suicidal person will always be suicidal and entertain thoughts of suicide	215 (59.6)

Table 4 Mean scores of depression and suicide literacy among studied students

	Min	Max	Mean	Std. deviation	Pearson correlation	*P*-value*
Depression literacy score	.00	11.00	7.8920	1.81872	*r* = 0.16	0.002
Suicide literacy score	.00	9.00	4.4515	1.78372		
Frequency (%) of students with literacy level ˃ means						
Depression	133 (36.8%)					
Suicide	104 (28.8%)					

Significance at *p* < 0.05

28.8% had a suicide literacy level above the mean suicide score. There was a weak but statistically significant positive correlation between the mean score of the depression literacy scale and that of the suicide literacy scale (*r* = 0.16, *p*-value = 0.002).

Table 5 reveals a statistically significant correlation between depression literacy scores and the male gender (*p* = 0.03) and a positive history of suicide ideations (*p* = 0.013). Additionally, family history of depression, suicidal attempts, consulting a psychiatrist, and previous mental health training had a statistically significant association with literacy scores for depression and suicide (*p* < 0.05).

Table 6 reveals that the predictors of high depression literacy scores were male gender (*p* < 0.05), family history of depression (*p* < 0.05), and history of suicidal ideations (*p* < 0.01), while it could not predict any significant factors for high suicide literacy scores.

Discussion

The study has revealed that 12.5% of medical students had suicidal ideations, which is consistent with the results of one meta-analysis conducted by Rotenstein et al. in 2016 [13]. This result is considered a red flag that should direct attention to the importance of increasing MHL for better prevention and treatment of mental problems. The study also demonstrated the poor literacy status of the studied students in terms of depression and suicide, as the mean D-Lit score was 7.8 with a range of 0–22, and the mean LOSS score was 4.4 with a range of 0–12. This result could be attributed to participants being recruited during the preclinical and early clinical phases prior to psychiatry training rotation. When comparing our results with other studies using the same scales among medical students, we found that the mean scores of D-Lit and LOSS were 12.05 and 4.05, respectively, for clinical students versus 8.05 and 3.1, respectively, for premedical students in the Sultanate of Oman [14]. The mean D-Lit score among Indian students was 13.21 [15], while among Bangladeshi students, it was 6.55 [9]. These differences can be attributed to the different methodology of the study, cultural background and educational status of the participants, the educational system, and the existing health promotional activities of the country.

The study also revealed that students scored lower on most items of the depression literacy scale. Many studies

Table 5 Relation between studied medical students' characteristics and depression and suicide literacy mean scores

Characteristics	Depression literacy means score	*P*-value	Suicide literacy means score	*P*-value
Sex				
Male	8.25 ± 1.9	**p= 0.03 s*	4.3 ± 1.8	*p** = 0.36*
Female	7.8 ± 1.8		4.5 ± 1.7	
Nationality				
Egyptians	8.0 ± 1.7	**p = 0.3*	4.5 ± 1.7	***p = 0.4*
Non-Egyptians	7.8 ± 1.9		4.3 ± 1.8	
Residence				
Rural	8.1 ± 1.6	**p = 0.2*	4.5 ± 1.16	***p = 0.11*
Urban	8.3 ± 1.7		4.7 ± 1.2	
Social class				
Low	6.7 ± 0.95	*p*** = 0.4*	4.3 ± 0.9	*p**** = 0.8*
Middle	7.9 ± 1.8		4.4 ± 1.8	
High	7.8 ± 1.9		4.6 ± 1.5	
Study grade				
2nd	7.1 ± 1.45	*P*** = 0.9*	4.6 ± 1.3	*p**** = 0.6*
3rd	7.26 ± 1.5		4.6 ± 1.45	
4th	7.22 ± 1.8		4.75 ± 1.46	
Medical history of chronic diseases				
No	7.35 ± 1.4	**p = 0.5*	4.2 ± 1.4	***p = 0.5*
Yes	7.5 ± 1.6		4.36 ± 1.5	
History of regular treatment				
No	7.9 ± 1.8	**p = 0.4*	4.2 ± 1.4	***p = 0.35*
Yes	7.66 ± 1.74		4.43 ± 1.5	
Personal history of psychiatric illness				
No	7.7 ± 1.8	**p = 0.22*	4.6 ± 1.8	***p = 0.65*
Yes	8.1 ± 1.74		4.45 ± 1.8	
History of suicidal ideations				
No	7.6 ± 1.8	**p= 0.013 s*	4.4 ± 1.7	***p = 0.27*
Yes	8.3 ± 1.5		4.7 ± 1.8	
Parents live				
Together	7.6 ± 1.3	**p = 0.5*	4.3 ± 1.6	***p = 0.4*
Separated	7.46 ± 1.5		4.1 ± 1.43	
Family history of depression				
No	7.8 ± 1.7	**p= 0.026 s*	4.1 ± 1.5	***p = 0.09*
Yes	8.4 ± 2.5		4.5 ± 1.8	
Family history of suicide attempts				
No	7.6 ± 1.8	**p = 0.18*	4.1 ± 1.8	***p= 0.03 s*
Yes	8.1 ± 1.6		4.9 ± 1.6	
Family history of consulting psychiatrist				
No	7.8 ± 1.8	**p= 0.046 s*	4.1 ± 1.4	***p= 0.04 s*
Yes	8.27 ± 1.8		4.6 ± 1.8	
Previous training on mental health				
No	7.4 ± 1.6	**p= 0.043 s*	4.2 ± 1.5	***p= 0.035 s*
Yes	7.8 ± 1.8		4.6 ± 1.8	

*t-test used, ****Mann-Whitney test, *****ANOVA test, ******Kruskal-Wallis test, *s* significant

Table 6 Binary logistic regression analysis showing the most important predictors of depression and suicide literacy

Variables	SE	Wald	Sig.	Odds ratio (95% CI)
Depression				
Gender (male)	1.21	3.43	**0.032***	1.33 (1.09–3.93)
Family history of depression	0.64	0.79	**0.010***	3.76 (1.32–7.11)
Family history of consulting psychiatrist	1.79	1.23	0.831	0.58 (0.22–3.65)
History of suicidal ideations	0.45	3.54	**0.003****	2.37 (1.23–4.69)
Previous training on mental health	0.14	5.22	0.827	0.31 (0.45–2.15)
Suicide literacy				
Family history of consulting psychiatrist	0.22	3.22	0.502	0.62 (1.17–2.09)
Family history of suicidal attempts	0.79	1.09	0.323	1.54 (1.32–4.37)
Previous training on mental health	1.21	2.53	0.645	2.61 (1.18–5.81)

reported comparable results [9, 14, 15]. Although most students could identify the somatic symptoms of depression, only a few correctly identified its psychiatric symptoms. In addition, only a few of them correctly reported that hospitalization was necessary for depressed patients to be hospitalized, while none of them could correctly identify the various treatment options for depression. This finding may be due to a lack of training on mental health as reported by most of those students and limited exposure or lack of experience as only a few of them had a personal or family history of mental disorders.

On the suicide literacy scale, most students scored lower on the majority of questions. According to Islamic Sharia law, suicide is forbidden. All students in our study are Muslims, and suicide is forbidden. When persons commit suicide, their families will be rejected by the community because of the stigma associated with suicide in the religion [16, 17]. Religious restrictions against suicide would affect the awareness of suicide and may partially explain why there is a lower suicide literacy in Islamic culture. This finding is supported by research conducted in Canada and India, which found that stigma, social traditions, and culture can influence an individual's level of awareness about mental health issues [18, 19]. In our study, we did not report or try to prove a relation between suicide literacy and Islamic religion because our sample was formed only of Muslims, i.e., we could not compare them with other religions. Furthermore, all religions, not only Islam, are considering suicide as a forbidden act from ALLAH". Religious prohibitions against suicide did not prevent the students studied from having suicidal thoughts, but they may have affected their awareness of suicide. Therefore, Muslim communities must be reeducated on suicide phenomena and their correlation to psychiatric disorders in order to eliminate the stigma associated with suicide. Despite poor general suicide literacy, most students correctly identified that consulting a psychiatrist or psychologist can help prevent someone from suicide, which is promising for the success of preventive efforts.

Furthermore, our study revealed a statistically significant positive correlation between literacy of depression and literacy of suicide. A similar result was reported in the meta-analysis by Rosenstein et al. [13]. This relationship could be attributed to the overlap of suicidality and depressive symptoms. Depression and suicidality are interrelated; as evidenced by the fact that the lifetime risk of suicide for patients with untreated depression ranges from 2.2 to 15%, depression is present in at least 50% of all suicides, and finally, people with depression are at 25 times higher risk for suicide than the general population [20]. Hence, preventing depression is a crucial aspect of suicide prevention.

Regarding the predictors of high depression literacy scores, the study revealed that the male gender was one of these predictors. The results of studies regarding gender differences in depression literacy were variables where a study in Bangladesh found that gender had a minor role in depression literacy among the university students [9]. In contrast, a study in India found that depression literacy was higher in females [15]. Family history of depression was another predictor of high depression literacy scores in this study, which is consistent with Elsheshtawy et al. [14], who found that previous exposure to psychiatric patients (family or friends) was a predictor of higher depression and suicide literacy. The study also revealed that a history of suicidal ideations was one of the predictors of high depression literacy scores, confirming the previously discussed overlap between suicidality and depressive symptoms.

Limitations

It was a cross-sectional study among 2nd, 3rd, and 4th-year medical students from only a single faculty, which impedes generalizing the study results. Furthermore,

large-scale, longitudinal, and interventional studies are required to generalize the results.

Conclusions

Based on the results, it is evident that depression and suicide literacy among medical students were low. Predictors of higher depression literacy include male gender, family history of depression, and history of suicidal ideations. As mental health problems, especially depression and suicide, commonly arise during adolescence, particularly among medical students, there is an urgent need to introduce mental health education early in medical school curricula rather than waiting until a medical student reaches the clinical years when such training is introduced. In addition, it is preferable to plan and implement specific training programs to improve MHL starting in high school education. The training can focus on symptoms of depression and suicide, appropriate help-seeking behaviors, and first-aid support.

Abbreviations
D-Lit: Depression literacy scale; MHL: Mental health literacy; LOSS: Suicide literacy scale; WHO: World Health Organization.

Authors' contributions
All authors conceptualized the study. RMS prepared the material. NMA conducted the data analysis. All authors contributed to the manuscript production. The author(s) read and approved the final manuscript.

Availability of data and materials
The data that support the current study's findings are available from the corresponding author on request.

Declarations

Ethics approval and consent to participate
The study protocol was approved by the Institutional Review Board (IRB) of the Faculty of Medicine, Zagazig University (reference no. 9360). The necessary official permission was obtained. Informed consent was also obtained from all the participants.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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