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ORIGINAL RESEARCH

Depression, Stress, Burnout and Associated Factors in Medical Students: A Cross-Sectional Study from a Turkish Medical School

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Abstract

Objective: Mental problems are common among medical school students, and these problems affect social and academic functionality. It was aimed to determine depression, stress and burnout levels of medical school students in a university which constitutes 3.25% of the all medical students in Turkey.

Methods: 1306 students studying in all classes at Gazi University Faculty of Medicine participated in this cross-sectional study. Sociodemographic data form, CES-Depression Scale (CES-D), Perceived Stress Scale (PSS), and Maslach Burnout Inventory Student Scale (MBI-SS) were applied to the participants.

Results: The mean score of the MBI-SS exhaustion subscale was 15.6, cynicism was 10.4, and the efficacy subscale was 11.7. The mean score of CES – D was 21.2 and PSS was 28.3. The prevalence of depression was estimated as 64.2%. Female participants showed higher scores in PSS, but lower scores in cynicism and efficacy. For exhaustion and cynicism, 1st graders' scores were significantly lower than all the others. For efficacy, 4th graders' scores were significantly lower than 1st and 6th graders'. In CES-D; the 4th graders' scores were significantly higher than the 1st and 3rd graders'. In PSS; 4th graders' scores were significantly higher than 1sts.

Conclusion: Stress, burnout, and depressive symptoms are high in medical students, especially in 4th graders and female students. It is considered to be important to raise awareness and plan preventive services on this issue.

Keywords: Medical Student, Mental Health, Depression, Stress, Burnout

INTRODUCTION

The health sector differs from many other professions in terms of quality, continuity, emergencies, and the vital importance of the service provided. Many factors such as physical injuries, infectious diseases, chemical risks, and radiation, pose risks for the physical health of healthcare workers (1). On the other hand; the mental health of healthcare professionals is also significantly affected due to a heavy workload that is based on human communication and intense empathy. Doctors are among the most difficult professions in the healthcare systems in terms of their decision-making powers, responsibilities, and risks. Studies are indicating that many mental problems such as depression, anxiety disorders, suicidal thoughts, alcohol-substance addiction, burnout, and sleep problems are commonly observed in doctors (2). With the scientific and technological developments advancing at a great pace, nowadays, the responsibility areas of doctors are increasing gradually, resulting with new stress factors such as working conditions, legal processes, or violence. In this difficult process that will last all life of a doctor from the first day of entering the medical faculty, the studentship period gains importance in terms of raising awareness and prevention strategies about mental problems.

The combination of adolescence and young adulthood, where mental problems are common (3), with a medical education period that has its own stress factors, makes medical students a very risky population. This can lead to mental problems such as depression, burnout, suicidal ideation and may result with medical school dropouts (4–6) It has been reported that the prevalence of depression is 22% – 49% (7), suicidal ideation is 11.1% (8), and burnout is 45% – 71% among medical students (9).

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Despite these high rates, medical students are not open and willing to seek psychiatric help (10). Difficulty in adopting the "patient role", which is common among doctors (11), can also be observed in medical students, especially from the upper classes (12). When there is a problem with their health, doctors seek advice from a doctor who is a friend or a family member instead of a routine referral to a healthcare provider. Often, without any of these, doctors seek to investigate and treat their own illnesses. This situation actually creates a disadvantage in getting adequate and structured healthcare (13,14) It has been reported by some medical authorities that doctors and their families need to be followed up and treated by independent health institutions and physicians (15,16).

Although there are some universal stress factors faced by medical students worldwide such as lack of time, workload, or financial problems (17); stress levels of medical students can vary between countries due to culture-specific stress factors, healthcare systems, or learning environments (18). Therefore; in order to improve the wellbeing of medical students and making preventive interventions, investigating stress factors that affect the mental health of the students is thought to be crucial.

In Turkey; the high number of student quotas constitutes the major problem in medical schools. Although a high number of students causes a crowd in the lecture halls in the first three grades, the transition to clinical phases in the 4th grade makes practical lessons and one-to-one patient examinations significantly difficult. This situation decreases the quality of education and limits the student-faculty relationship. Two important conditions that affect the stress levels of students during their medical education are compulsory service and specialty examination. In our country, all doctors take a very hard medical specialty exam after their graduation, and those who fail are assigned by the ministry with compulsory service in various regions of the country. On the one hand, students are trying to form the basic medical knowledge and the notion of a medical practitioner to be able to work in compulsory service; and on the other hand, most of them go to private teaching institutions to win the specialty exam, which has turned into a race almost from the first years of medical school. Therefore, the significant workload on students causes many different stressors and negatively affects their mental health.

Studies from Turkey shows the importance of depression among medical students with a prevalence rate of 10% to 40%. Female gender, low socioeconomic status, living in a dormitory, smoking, and exposure to violence have been reported as potential risk factors. The high levels of depression and anxiety in the first and sixth grades draw attention to the importance of preventive measures in these classes. The relatively small sample sizes and absence of all grades in the samples, limit the generalizability of the results of the studies conducted in this field in our country. Prospective studies are needed to examine the variables between the beginning of medical school and the graduation period, and even to obtain information about mental health after graduation (19). In this largest sample sized study conducted with medical students in Turkey to our knowledge; it was aimed to investigate depression, stress levels, burnout, and related factors in medical students. Furthermore; it is aimed that these data will form a basis for at least a 6-year prospective study, and a medical student mental health program has been planned after identifying potential risk factors.

METHODS

This cross-sectional study was conducted in a public medical school in Ankara, Turkey between March and May 2019.

Participants

The universe of the study consisted of 2910 students who were currently medical students from all grades at Gazi University in the 2018-2019 academic years. In the same year, 89356 medical students have been studying at 96 medical schools in Turkey (20) and Gazi University has the highest medical student quota in the country (21). This corresponds to 1/30 of all medical students. It was targeted to reach the whole universe but the students were not forced to participate in the study. After giving information about the research, students were told that participation is voluntary and anonymity will be assured. 1362 participants gave consent and in total, 1306 of them who completed the surveys completely were included in the study. Therefore, 44.8% of the universe was reached. The ethical approval was obtained from the Ethics Committee of Gazi University on date 14.01.2019 with the number 28.

Instruments

Sociodemographic data were collected from all participants, including age, sex, year of medical school, family income, etc.

For assessing depression, The Center for Epidemiologic Studies Depression Scale (CES-D), developed by the American National Mental Health Institute was used (22). The CES-D is a self-report scale comprising 20 items that measure the major dimensions of depression. The frequency of each item is scored on a four-point scale ranging from 0 (rarely or none of the time) to 3 (most or all of the time). Higher scores indicate more depressive responses and a score of 16 or greater is generally considered to be indicative of a depressive disorder. It has been reported that with the frequently used cut-off of 16, the sensitivity of the scale for major depression is 100%, and the level of specificity is 88%. The validity and reliability study of the Turkish form was performed by Tatar and Saltukoğlu (23).

Perceived Stress Scale (PSS) was used to determine stress levels. PSS is a 5-Likert type scale widely used in studies assessing stressfulness of events, physical and psychiatric diseases. It was originally developed as a 14-item scale that assesses the perception of stressful experiences by asking the respondent to rate the frequency of his/her feelings and thoughts related to events and situations that occurred over the previous month (24). In the Turkish validity and reliability study, the internal consistency coefficient of the scale was found as 0.84 and test-retest reliability as 0.87 (25).

Maslach Burnout Inventory-Student Survey (MBI-SS): MBI-SS was, developed by Hu and Schaufeli (26), and has been adapted to Turkish by Çapri et al. It is a 5 – Likert type scale and is comprised of 16 items and three subscales (exhaustion, cynicism, and efficacy) Higher scores in the exhaustion and cynicism and lower scores in the efficacy indicate more burnout levels. (27).

Procedure

Following the permission letter obtained from the Dean's Office regarding the application of the study to medical students, a meeting was held with the vice dean, all term coordinators, one representative student from all classes, and the research team. In this meeting, the team was informed about the research and the methods of implementation were discussed. With the decision taken here, before the lessons in lecture halls with compulsory attendance in the first three classes, information about the study was given and questionnaires were distributed to those who agreed to participate. Since 4th, 5th, and 6th-grade students are in clinical internships, it was not possible to reach all classes at the same time, so the questionnaires were made online with Google forms and shared via e-mail groups. All medical students at all grades in Gazi University Faculty of Medicine have been included in the study and the only exclusion criteria was refusing to participate. Snowball sampling method was used.

Statistical Analysis

Statistical analysis was performed using SPSS 22.0 for Windows (SPSS, Inc .; Chicago, USA) package program. Descriptive values were stated as number (n), percentage (%), mean, standard deviation (SD). Independent t test was used to compare categorical variables (gender, smoking and alcohol use), and one-way ANOVA was used to compare parametric variables (year of medical school, residence status and monthly family income). An overall p value of less than .05 was considered to show a statistically significant result. When an overall significance was observed, pairwise post hoc tests were performed using Tukey's test. Multiple linear regression analysis was used to identify independent predictors of CES-D and PSS scores. Pearson correlation analysis was used to evaluate the relationship between the scores of the CES-D, PSS and MBI-SS.

RESULTS

Sociodemographic characteristics of the sample

1306 students participated in the study consisting of 774 females (59.3%) and 532 males (40.7%). Table 1 represents demographic and clinical variables and scale scores of the participants. While the participation rate was relatively high among the first three graders, it was relatively low among the last three graders with the lowest among the 6th year students (6.0%). The majority of the participants were living with their family (38.9%) and had a monthly family income of 1700-5500 Turkish Liras (47.2%). 23.7% of respondents reported smoking whereas rates of alcohol and substance use were 31.4% and 4.1% respectively. 82% of drug users were using cannabis, 5.1% methamphetamine, 5.1% ecstasy, 5.1% volatiles, and 2.5% cocaine. 21.7% of the participants reported that they had previously been admitted to psychiatry. While 9.3% of them stated that they were not diagnosed with any kind of disease, the most common diagnoses were anxiety disorders (36.4%) and depressive disorders (30.8%). Psychiatric medication use was stated from 8.3% of participants. The most common type of medication was antidepressants (87.8%). 39.4% of the students found their level of knowledge about psychiatric diseases as sufficient. The majority of the students (63.4%) preferred to admit to their own faculty when they need psychiatric help (Table 1)

Table 1. Sociodemographic characteristics and scale scores of the participants

		N	%
Gender			
	Female	774	59.3
	Male	532	40.7
Year of Medical school			
	1	381	29.2
	2	263	20.1
	3	284	21.7
	4	132	10.1
	5	168	12.9
	6	78	6.0
Monthly Family Income (TL)			
	<1700	83	6.4
	1700-5500	616	47.2
	>5500	607	46.5
Residence Status			
	Home – with family	508	38.9
	On-campus housing	488	37.4
	Home – with a friend(s)	234	17.9
	Home-alone	76	5.8
Smoking			
	No	997	76.3
	Yes	309	23.7
Alcohol use			
	No	896	68.6
	Yes	410	31.4
Substance use			
	No	1252	95.9
	Yes	54	4.1
Psychiatric application			
	No	1023	78.3
	Yes	283	21.7
Psychiatric medication use			
	No	1198	61.7
	Yes	108	8.3
Level of knowledge about psychiatric diseases			
	None	74	5.7
	Insufficient	718	55.0
	Sufficient	514	39.4
Psychiatric application preference			
	Own faculty	828	63.4
	Private office	238	18.2
	Public hospitals	205	15.7
	Campus outpatient clinic	35	2.7

		N	Mean	Min	Max	SD
MBI-SS						
	Exhaustion	1305	15.6	5.0	68.0	4.8
	Cynicism	1304	10.4	4.0	20.0	3.7
	Efficacy	1304	11.7	4.0	65.0	3.3
CES-D		1306	21.2	0.0	57.0	11.5
PSS		1304	28.3	4.0	56.0	8.3

TL: Turkish Liras, MBI-SS: Maslach Burnout Inventory-Student Survey CES-D: The Center for Epidemiologic Studies Depression Scale, PSS: Perceived Stress Scale

The mean score of the MBI-SS in the exhaustion subscale was 15.6±4.8, cynicism was 10.4±3.7 and efficacy was 11.7±3.3. Mean CES-D and PSS scores of the participants were 21.2±11.5 and 28.3±9.3, respectively (Table 1). The rate of participants whose CES-D scores were above the cut-off point of 16 was 64.2%.

Table 2 shows the differences of scale scores in terms of demographic variables. The independent t test was used to determine the differences in scale scores between genders, smoking, and alcohol use status. A statistically significant difference was found in PSS and cynicism and efficacy subscales of MBI-SS. On average, cynicism scores of male students (M=11.1, SD=3.8) were higher than female students (M=10.0, SD=3.5). This difference, 1.1, [-1.54, – 0.72] was statistically significant, t (1090.06) =-5.41, p <.001. Efficacy scores of male students (M=12.0, SD=3.8) were higher than female students (M=11.6, SD=2.9). This difference, 0.4, [-0.80, – 0.33] was statistically significant, t (931.83)=-2.13, p <.05. PSS scores of male students (M=27.5, SD=8.7) were lower than female students (M=28.8, SD=7.9). This difference, 1.3, [0.38, 2.25] was statistically significant, t (1067.97)=2.77, p <.05. According to smoking status statistically significant differences were found in all scales. On average, exhaustion scores of smokers (M=16.8, SD=4.7) were higher than non-smokers (M=15.5, SD=4.8). This difference, 1.3, [-2.20, – 0.98] was statistically significant, t (520.39) =-5.13, p <.001. Cynicism scores of smokers (M=11.3, SD=4.0) were higher than non-smokers (M=10.1, SD=3.5). This difference, 1.2, [-1.64, – 0.64] was statistically significant, t (470.47) =-4.50, p <.001. Efficacy scores of smokers (M=11.3, SD=3.0) were lower than non-smokers (M=11.9, SD=3.3). This difference, 0.6, [0.18, 0.99] was statistically significant, t (556.54) =2.87, p <.05. CES-D scores of smokers (M=23.3, SD=12.2) were higher than non-smokers (M=20.5, SD=11.2). This difference, 2.8, [-4.29, – 1.21] was statistically significant, t (478.18) =-3.50, p <.001. PSS scores of smokers (M=29.4, SD=8.5) were higher than non-smokers (M=28.0, SD=8.2). This difference, 1.4, [-2.46, – 0.29] was statistically significant, t (495.27) =-2.49, p <.05. there was a significant difference between alcohol use and exhaustion and cynicism subscales of MBI-SS and CES-D. On average, exhaustion scores of alcohol users (M=16.2, SD=4.7) were higher than non-users (M=15.3, SD=4.8). This difference, 0.9, [-1.44, – 0.32] was statistically significant, t (809.19) =-3.01, p <.05. Cynicism scores of alcohol users (M=10.8, SD=3.7) were higher than non-users (M=10.2, SD=3.6). This difference, 0.6, [-1.04, – 0.17] was statistically significant, t (776.16) =-2.73, p <.05. CES-D scores of alcohol users (M=22.2, SD=11.9) were higher than non-users (M=20.7, SD=11.1). This difference, 1.5, [-2.92, – 0.17] was statistically significant, t (756.26) =-2.13, p <.05.

One-way ANOVA was used to investigate the differences of scale scores between the year of medical school, residence status and monthly family income and when there as a significance, Tukey test was performed as post-hoc tests. There was a statistically significant difference in all subscales of MBI-SS and CES-D between grades. Post hoc tests revealed that the exhaustion scores of 1st grades (M=14.4, SD=4.4) were lower than the all grades [F (5, 1299) = 9.09, p < .001]. Cynicism scores of 1st grades (M=9.6, SD=3.4) were lower than the all grades [F (5, 1298) = 7.25, p < .001]. Efficacy scores of 4th grades (M=10.8, SD=2.6) were lower than 1st (M=12.1, SD=3.0) and 5th (M=12.1, SD=2.8) grades [F (5, 1298) = 3.32, p < .05]. CES-D scores of 4th grades (M=24.3, SD=11.9) were higher than 1st (M=20.5, SD=10.8), 2nd (M=20.7, SD=12.0), and 5th (M 21.9, SD=12.2) grades [F (5, 1300) = 3.76, p < .05]. There was a statistically significant difference in all subscales of MBI-SS between residency status. Post hoc tests revealed that the exhaustion scores of participants living in campus (M=15.0, SD=4.4) were lower than the ones living alone (M=17.0, SD=4.8) and living with friends (M=16.1, SD=4.6) [F (3, 1301) = 5.32, p < .05]. Cynicism scores of participants living alone (M=11.7, SD=4.2) were higher than the ones living in campus (M=10.1, SD=3.6) and living with family (M=10.3, SD=3.6) [F (3, 1300) = 6.55, p < .001]. Efficacy scores of participants living alone (M=11.7, SD=4.2) were lower than the ones living in campus (M=10.1, SD=3.6) and living with family (M=10.3, SD=3.6). Participants living with friends (M=11.0, SD=3.6) took higher scores than the ones living in campus [F (3, 1300) = 6.55, p < .001]. There was a statistically significant difference in CES-D and PSS between monthly family income. Post hoc tests revealed that the CES-D scores of participants with the income of 1700> TL (M=23.06, SD=12.2) were higher than the ones with 5500< TL (M=20.4, SD=11.5) [F (2, 1303) = 3.86, p < .05]. PSS scores of participants with the income of 1700> TL (M=30.1, SD=7.3) were higher than the ones with 5500< TL (M=27.7, SD=8.5) [F (2, 1301) = 4.24, p < .05].

Table 2. Comparison of scale scores according to demographic variables

	MBI-SS (Mean±SD)			CES-D (Mean±SD)	PSS (Mean±SD)
	Exhaustion	Cynicism	Efficacy		
Gender					
Female	15.4±4.5	10.0±3.5	11.6±2.9	21.4±11.3	28.8±7.9
Male	15.8±5.2	11.1±3.8	12.0±3.8	20.8±11.7	27.5±8.7
p	.181	**.000**	**.033**	.317	**.006**
Year of Medical school					
1	14.4±4.4	9.6±3.4	12.1±3.0	20.5±10.8	27.7±7.9
2	16.1±5.6	10.9±3.8	11.6±4.4	20.7±12.0	28.4±9.1
3	15.8±4.4	10.6±4.0	11.8±2.8	19.9±10.3	28.3±7.7
4	16.9±4.5	10.2±3.2	10.8±2.6	24.3±11.9	30.4±7.2
5	15.6±4.5	10.9±3.5	12.1±2.8	21.9±12.2	27.8±8.7
6	17.0±4.8	11.6±3.6	11.5±3.5	23.6±13.4	28.6±9.1
p	**.000**	**.000**	**.005**	**.002**	.055
Residence Status					
Home – with family	15.7±5.2	10.3±3.6	11.9±3.8	20.7±11.7	28.3±8.8
On-campus housing	15.0±4.4	10.1±3.6	11.9±2.8	21.3±10.9	28.3±7.7
Home – with friend(s)	16.1±4.6	11.0±3.6	11.4±2.9	21.5±11.9	27.9±8.2
Home-alone	17.0±4.8	11.7±4.2	11.0±3.4	22.9±12.1	29.5±8.3
P	**.001**	**.000**	**.040**	.392	.560
Monthly Family Income (TL)					
1700>	15.8±4.9	10.5±3.7	11.4±2.6	23.6±12.2	30.1±7.3
1700-5500	15.4±4.6	10.3±3.6	11.8±2.9	21.7±11.4	28.7±8.1
5500<	15.8±5.0	10.5±3.7	11.7±3.7	20.4±11.5	27.7±8.5
p	.377	.673	.527	**.021**	**.014**
Smoking					
No	15.2±4.8	10.1±3.5	11.9±3.3	20.5±11.2	28.0±8.2
Yes	16.8±4.7	11.3±4.0	11.3±3.0	23.3±12.2	29.4±8.5
P	**.000**	**.000**	**.006**	**.000**	**.013**
Alcohol use					
No	15.3±4.8	10.2±3.6	11.7±2.9	20.7±11.3	28.0±8.0
Yes	16.2±4.7	10.8±3.7	11.8±4.1	22.2±11.9	28.9±8.8
p	**.002**	**.006**	.833	**.027**	.090
Substance use					
No	15.6±4.8	10.4±3.7	11.7±3.3	21.2±11.4	28.3±8.2
Yes	16.4±4.9	11.0±3.9	12.1±3.2	21.2±12.5	29.0±9.6
p	.209	.294	.419	1.000	.568

TL: Turkish Liras, MBI-SS: Maslach Burnout Inventory-Student Survey CES-D: The Center for Epidemiologic Studies Depression Scale, PSS: Perceived Stress Scale

Variables that were found as significant in the independent t test and one-way ANOVA were included in the regression analysis together with the data stated as affecting depression and stress levels of medical students in the literature. A multiple linear regression model was conducted to examine the independent effects of predictors on CES-D scores (Table 3). As a result of the analysis, it was found that a significant regression model, $F(12, 1293)=3.55$, $p < .001$, and 0.023% (adjusted $R^2=0.023$) of the variance in CES-D scores were explained by independent variables. Having a monthly income of <1700 TL ($\beta=0.81$, $t(1293)=2.80$, $p<.05$), being 4th grade ($\beta =0.088$, $t(1293)=2.90$, $p < .05$) and smoking ($\beta =0.099$, $t(1293)=3.25$, $p < .001$) significantly predicted CES-D scores.

Table 3. Multiple linear regression results for predicting CES-D scores

				95% CI		
	β	Standard error	t	LL	UL	p
Gender[a]	.049	.663	1.735	-.150	2.452	.083
Monthly income[b]	.081	1.367	2.792	1.135	6.497	**.005**
Year of medical school[c]	.088	1.170	2.891	1.088	5.679	**.004**
Residence status[d]	-.061	1.425	-1.006	-4.230	1.362	.314
Smoking	.824	.824	3.245	1.057	4.289	**.001**
Alcohol use	.044	.763	1.437	-.400	2.593	.151

Adjusted R^2= .023 p<.001; LL, lower limit; UL, upper limit; [a] female; [b] <1700 TL; [c] 4th grades; [d] living alone

A multiple linear regression model was conducted to examine the independent effects of predictors on PSS scores (Table 4). It was found that a significant regression model, F(12, 1291)=3.63, p < .001, and 0.033% (adjusted R^2=0.033) of the variance in PSS scores were explained by independent variables. Female gender (β=0.094, t(1291)=3.34, p<.001), having a monthly income of <1700 TL (β=0.089, t(1291)=3.07, p<.05), being 4th grade (β =0.069, t(1291)=2.26, p < .05) and smoking (β =0.073, t(1291)=2.40, p < .05) significantly predicted PSS scores.

Table 4. Multiple linear regression results for predicting PSS scores

				95% CI		
	β	Standard error	t	LL	UL	p
Gender[a]	.094	.479	3.331	.655	2.534	**.001**
Monthly income[b]	.089	.986	3.064	1.086	4.953	**.002**
Year of medical school[c]	.069	.844	2.260	.252	3.563	**.024**
Gender[a]	-.052	1.027	-.865	-2.904	1.127	.387
Smoking	.073	.594	2.397	.0259	2.589	**.017**
Alcohol use	.044	.550	1.448	-.283	1.875	.148

Adjusted R^2= .033 p<.001; LL, lower limit; UL, upper limit; [a] female; [b] <1700 TL; [c] 4th grades; [d] living alone

Pearson correlation analysis was performed to analyze the correlation between the scale scores (Table 5). There was a statistically significantly positive correlation between all the scale scores except the Efficacy subscale of the MBI-SS. It was found that MBI-SS Efficacy was significantly negatively correlated with all the other scale scores.

Table 5. Correlation between the scores of CES-D, PSS, and MBI-SS

		CES-D	PSS	MBI-SS Exhaustion	MBI-SS Cynicism	MBI-SS Efficacy
CES-D	Pearson Correlation	1	.740*	.426*	.385*	-.334*
	Sig. (2-tailed)		**.000**	**.000**	**.000**	**.000**
	N	1306	1304	1305	1304	1304
PSS	Pearson Correlation	.740*	1	.466*	.376*	-.434*
	Sig. (2-tailed)	**.000**		**.000**	**.000**	**.000**
	N	1304	1304	1303	1302	1302
MBI-SS Exhaustion	Pearson Correlation	.426*	.466*	1	.685*	-.388*
	Sig. (2-tailed)	**.000**	**.000**		**.000**	**.000**
	N	1305	1303	1305	1304	1304
MBI-SS Cynicism	Pearson Correlation	.385*	.376*	.685*	1	-.376*
	Sig. (2-tailed)	**.000**	**.000**	**.000**		**.000**
	N	1304	1302	1304	1304	1303
MBI-SS Efficacy	Pearson Correlation	-.334*	-.434*	-.338*	-.376*	1
	Sig. (2-tailed)	**.000**	**.000**	**.000**	**.000**	
	N	1304	1302	1304	1303	1304

*Correlation is significant at the 0.01 level (2-tailed)

DISCUSSION

In our study, the mean CES-D score of the participants is 21.2 and the prevalence of depression according to the cut-off point of the scale is 64.2%. One of the studies conducted with medical students using the same scale was carried out in Korea and the other in the US in the same year, 2010. In Korea; the mean CES-D score was reported as 14.1 and the prevalence of depression was 37.1% (28). In the US, the mean score was not stated but the prevalence of depression was found as 59.1% in a more specific population which consisted of only female students in the first two grades (29). A recent meta-analysis in China reported a 29% nationwide prevalence of depression among medical students (30). A prevalence of 16.4% (31) and 12.9% (32) were reported from the UK and Sweden, respectively. In addition to these studies, which report very low rates compared to our study, higher results close to ours were usually reported by developing countries. The prevalence of depression was reported as 35.1% from Pakistan (33), 30-43% from Saudi Arabia (34), and 60.6% from Syria which was affected by

the Syria war at the time of the study (35). The welfare of countries and social events inevitably affect the mental health of medical students as well as the entire population. However; there may be also culture-specific factors that concern medical students differently from the general public.

In Turkey, the small number of doctors corresponding to a high patient population constitutes a heavy workload resulting in an extremely high number of patients seen by a doctor per day. Recently increasing malpractice cases and violence against healthcare workers put an extra burden on such intensive working doctors. These factors may be related to the high prevalence of depression in our study, but the methodological differences of studies, as well as the differences in the curricula, teaching and assessment techniques of faculties, restrict the interpretation of the results.

When studies in this field are examined in our country; it is seen that the prevalence of depression in medical students varies between 13% and 41%, depending on the sample and the methodology (19). The closest result to our study was reported as 41% from another university of the same city, Ankara which is the capital of Turkey (36). A prevalence of 64.2% found in our study, points to a significantly higher rate of depression compared to other studies in our country but some points need to be kept in mind when analyzing the results. The aforementioned study was conducted with 348 participants in 2013. Our study, with a sample of 1306 participants, is the largest sample-sized study conducted on medical students in our country so far. Additionally, from 2013 to 2019, when our study was conducted, new factors may have emerged that could affect the mental health of medical students. Increasing student quotas with each passing year reduce the quality of medical education, especially practical lessons that require one-to-one interaction. This situation also limits the social relationship of students both among themselves and with the academic staff. Therefore; engagement with the faculty, and formation of the "doctor identity" are interrupted, resulting in a decrease in students' motivation.

In MBI-SS, mean scores of three subscales were 15.6 for exhaustion; 10.4 for cynicism, and 11.7 for efficacy. In a study conducted in 2012 with US medical students using the same scale, mean scores were reported as 17, 9, and 10 (37). In the same year, mean scores of the same scale were reported as 16,3, 7.4, and 27.9 from Brazil (38). Two studies from Turkey report these scores as 18,7,13 and 17,6,19 (39,40). As the sample of these two studies consists of only last grades, it is not surprising that they faced more burnout in exhaustion but less in efficacy in the most effortful year of medical school at the same time gaining the most clinical experience.

Doctors were shown to face most burnout in exhaustion and cynicism among healthcare workers including nurses, midwives, and emergency medical technicians (Helvaci et al., 2013). Medscape, an online platform providing communication and medical information for healthcare professionals, organized a survey with approximately 15 thousand physicians and stated that 48% of them experience burnout (42). Prevalence of burnout in US medical students was reported as 45% to 71% (9). When all these data are combined with the results of our study, it can be said that burnout seen in all stages of a doctor's life also exists during medical education.

The mean PSS score of students who participated in this study was 28.3. In Pakistani medical students, the mean score of the same scale was found as 30.8 (43). There have been other studies conducted with doctors using PSS and as mean scores of the scale; 26.2 was reported from France (44), 24 from Portugal (45), and 24.6 from Australia (46).

In this study, the effects of some sociodemographic variables on scale scores were also examined. Gender was not related to depression, but the stress levels of female students were higher than male ones. In MBI-SS male students experience more burnout in cynicism but less in efficacy. There are contradictory results in the literature regarding the effect of gender on depression and stress in medical students but the data on burnout is noteworthy. Male students' high burnout level in cynicism in our study is compatible with many studies showing that men are more desensitized than women (47,48). Men may consider experiencing and sharing emotional reactions as a sign of weakness, especially in societies with traditional gender roles. Therefore, their emotional expressions may be limited and it can be a reason for increased desensitization (49). More burnout levels of female students are also compatible with other studies but there are contradictory results which are thought to be related to cultural issues. A study from Spain reported no difference between male and female medical students in terms of burnout levels and linked this to the fact that most of the students are female and they no longer need to make an effort to have equal rights with their male colleagues (50). Fang et al. compared medical and non-medical students in terms of gender and found more burnout levels in female medical students compared to non-medical female students; however, there was not such a difference between male peers (37). More burnout levels in female students in the

field of efficacy in our study, in fact, could be a reflection of society's perspective on women doctors, thinking that our country made much progress on gender inequality but still mostly has traditional gender roles.

When depressive symptoms were compared between the year of medical school, it was seen that the highest mean of CES-D was in the 4th grades. In paired comparisons, 4th grades had significantly higher scores than 1st and 3rd grades. Similarly, stress levels of 4th grades were found to be higher than the 1st grades. In the MBI-SS exhaustion and cynicism subscales, 1st grades were significantly lower than all the other grades. For efficacy, 4th grades were significantly lower than 1st and 6th grades. According to the results, it can be said that especially 4th graders are at risk in terms of mental problems in our study. There are studies from Turkey reporting upper classes or first grades are riskier, or that there is no difference between grades and this may be related to universities' own systems (19). In our study, high rates among 4th graders are thought to be a result of the transition to clinical phases that are based on practical lessons, patient examinations, and oral exams.

Monthly family income was another factor found in our study that affected depression and stress levels. These results are not surprising, considering studies showing negative mental health outcomes of low income and socioeconomic status in both medical students (51) and in the general population (52). Smoking was found as predicting depression and stress levels according to regression analysis but this should be interpreted with cautious. It has been shown in many studies that smoking is common in medical students and negatively affects mental health (19). However; smoking has a bidirectional relationship with depression and stress, it can be a component or a consequence, so it is thought that a clear interpretation is not possible.

In our study, 21.7% of the participants stated that they applied to a psychiatry clinic and 9.3% of them were not diagnosed with any disease whereas 67.2% of those who admitted to psychiatry were diagnosed with depression or anxiety disorders. This means that 11% of the sample have depression or anxiety disorder at the time. Having a psychiatric diagnosis may increase depression, stress, and burnout levels. On the other hand; 8.3% of the participants stated that they use a psychiatric medication and 87.8% of the used medications were antidepressants. It can be also assumed that antidepressant use may decrease the scale scores. Due to these possible contradictory interactions; effects of the psychiatric variables on the scale scores were not examined and they were not included in the regression model.

This study has several limitations. First, the results cannot be generalized to all students because only those who give consent were included in the study, so the representation of the 4th, 5th and 6th grades was insufficient because of their low participation rates. The frequency of psychiatric symptoms in the study may have been higher than expected because those who experienced these symptoms might be more willing to fill out the questionnaire. Since the scales in this study are used for screening psychiatric symptoms and a clinical interview was not possible because of the large sample, results may not reflect real prevalence of the diagnoses. Besides these limitations, this largest sample-sized study conducted in Turkey so far points to a high prevalence of depression and increased levels of stress and burnout in medical students. Medical education is important for preventive mental health interventions for the prevention, screening, and early recognition of mental symptoms that can be seen in all stages of medical life. As Slavin reported, these interventions produced significant improvements in the students' mental life with an 85% reduction in the depression rate and a 75% decrease in the anxiety rate (53). From this point of view, it can be said that it will be an important public health intervention for universities to identify their specific stress factors and develop protective mental health practices accordingly.

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