



# Examining Burnout, Depression, and Attitudes Regarding Drug Use Among Lebanese Medical Students During the 4 Years of Medical School

Farid Talih<sup>1</sup> · Michel Daher<sup>1</sup> · Dayane Daou<sup>2</sup> · Jean Ajaltouni<sup>1</sup>

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## Abstract

**Objectives** This study aims to evaluate the prevalence of burnout, depressive symptoms, and anxiety symptoms and attitudes toward substance use in medical students as well as their evolution during the 4 years of medical school.

**Methods** A cross-sectional study was carried out at the American University of Beirut Medical Center (AUBMC) between September and December 2016. In total, 176 out of 412 eligible medical students responded. The survey was anonymous and administered via e-mail link to an electronic form. The study included general socio-demographic questions and standardized validated tools to measure depressive symptomatology (PHQ-9), burnout (Burnout Measure), anxiety (GAD-7), alcohol use (AUDIT), and substance abuse (DAST-10) as well as questions pertaining to attitudes toward recreational substance use.

**Results** Overall, 23.8% of medical students reported depressive symptomatology, with 14.5% having suicidal ideations. Forty-three percent were found to have burnout. Those who screened positive for burnout were more likely to be males, to be living away from their parents, and to have experienced a stressful life event during the last year. With the exception of burnout, there was no significant difference in the prevalence of depression or anxiety among the 4 years of medical school. There was a significant difference in alcohol use, illicit substance use, and marijuana use during the four medical school years.

**Conclusions** The results of this study show high rates of depression, burnout, and suicidal ideation among medical students from the Middle East region. Increased rates of substance use were detected as well as a more tolerant attitude toward substance use in general, specifically cannabis. It is crucial that medical educators and policymakers keep tackling the complex multifactorial mental health issues affecting medical students and design effective solutions and support systems.

**Keywords** Medical students · Mental health · Suicide · Burnout · Depression

Medical students are exposed to academic, personal, and financial stressors that can lead to burnout [1]. Burnout manifests as emotional exhaustion and a low sense of accomplishment [2–4]. Recent data from Sweden shows that 12.9% of medical students screen positive for depression and that 2.7% of medical students have attempted suicide [5]. Higher rates have been reported in the United States (US) where a large multi-centered study found that 58.2% of medical students screen positive for depression and up to 52.8% experience burnout [2, 3]. Medical school is a psychologically and physically demanding endeavor that can lead to burnout. Medical

school and hospital shift work are associated with chronic sleep deprivation, which has been linked to depression in this group [6].

Physicians have a higher rate of suicide than the general population. The suicide rate among male physicians is 40% higher than in men in the general population. The suicide rate among female physicians is 130% higher than in women in the general population [7, 8]. Among medical students, available data suggests a higher rate of suicide than in the general population as well [9, 10]. Data shows that up to 13% of medical trainees (residents) experience suicidal ideation and up to 15% of medical students report suicidal ideation during training [11–14]. It is possible that the increased suicide rate among physicians may have its origins in medical school [15].

Substance use disorders (SUD) are common in health care workers in general, including physicians. In a study examining the prevalence of SUD among medical students, 10% of students reported a history of substance abuse. Students reported using alcohol, marijuana, psychedelics, sedatives, and opioids.

✉ Farid Talih  
ft10@aub.edu.lb

<sup>1</sup> American University of Beirut Medical Center, Beirut, Lebanon

<sup>2</sup> American University of Beirut, Beirut, Lebanon

The majority of students reported that they started to use substances during their undergraduate college years [16]. Data from the Middle East shows that up to 14% of residents have substance abuse problems [14]. The rituals of socialization in medical school and the emotional stress experienced by medical students were found to be contributing factors for SUD [17]. Substance abuse has been linked to burnout, mood, and anxiety symptoms among health care workers [14, 18, 19].

Burnout in health care workers is a global issue. However, sparse data is available from our region. The Middle East region suffers from chronic psychosocial stress due to ongoing political violence and social instability. Twenty-two percent of residents training at our university medical center reported moderate to severe depressive symptoms and 13% reported suicidal ideation [14].

The medical school at the American University of Beirut Faculty of Medicine (AUBFM) is considered one of the oldest medical schools in Lebanon and in the region. The AUB was chartered by the state of New York in 1863. The university is regarded as one of the premier centers of higher education in the Middle East and attracts students from across the region. The AUBFM follows the United States model of medical education, which is unusual in our region. Admission to the medical school is highly competitive and students go through a rigorous selection process in their premedical education. The relatively high cost of tuition at the AUBFM is an additional stressor when compared to other local or regional medical schools. AUBFM medical students are usually expected to pursue residency training in the US, which incurs extra academic, psychological, and financial burdens.

AUBFM is centrally located in the capital city and students attend from all parts of the country. The majority of students are Lebanese; however, there is substantial regional representation from neighboring countries. Lebanon is a culturally and religiously diverse eastern Mediterranean Arab country with a francophone background. The university follows a strict non-discriminatory policy (including religion and ethnicity) and promotes gender equality; approximately half of the medical students are female. The AUBFM can serve as a case study for the globalization and cross-cultural influences in international medical education.

The primary objective of this study is to evaluate the prevalence of burnout, mood, and anxiety symptoms, and substance use in a Lebanese medical school and to examine the evolution of these conditions during the 4 years of medical school. The findings of this study will be compared to international data. A secondary objective is to evaluate attitudes regarding substance use among medical students in the different years of medical school. The authors hypothesize that the prevalence of burnout, depressive symptoms, and substance abuse will be at least similar to international data. We will also examine any possible increase in burnout and substance use as students progress through medical school.

## Methods

This study was conducted in Lebanon, a middle-income country representative of developing countries in the Middle Eastern region. The medical students surveyed were enrolled in the AUBFM, a medium-sized 4-year medical school which follows a US-based curriculum. Medical students are required to complete a 3- to 4-year undergraduate degree before starting medical school. Students have to sit for the Medical College Admission Test (MCAT) prior to admission to the AUBFM. There are 100 students per class on average. The first and second years of medical school are classroom based, while the third and fourth years are mostly various clinical clerkships. This research project was reviewed and granted full approval by the Institutional Review Board of the American University of Beirut in 2016.

This was a cross-sectional study conducted at the AUBFM between September and December of 2016. All medical students at any stage of medical education at AUBFM were eligible to participate. The total number of eligible participants was 412 students. Data was gathered via an anonymous online survey that was sent to all the medical students. Subsequently, e-mail reminders were sent out every 3 weeks for 3 months. Informed consent was obtained electronically. We developed an online survey consisting of three categories:

1. General demographic and mental health data.
2. Substance use and attitudes toward substance use.
3. Rating scales for burnout, mood, and anxiety symptoms.

Demographic and mental health data included the following: gender, age group, nationality, marital status, living arrangements, medical school year, the presence of any personal stressors or any current negative life event, cigarette smoking, water pipe smoking, caffeine/coffee consumption, alcohol consumption, history of any mental health diagnosis or treatment, history of suicide attempts or self-harm, self-reported hours of sleep, use of sleeping aids, recreational substance use, psychotropic drug use, and the presence of general medical problems. Participants were also screened for any family history of mental health issues. The students were also asked several questions to gauge attitudes regarding illicit substance use.

The burnout, mood, anxiety, and substance use rating scales used were the following: The patient health questionnaire (PHQ-9) is a validated questionnaire that screens for depression. It consists of nine items scored from 0 to 3. A score  $\geq 10$  detects depression with 93% sensitivity and 88% specificity. Scores of 10 to 14, 15 to 19, and  $\geq 20$  indicate moderate, moderately severe, and severe depression, respectively [20]. We assessed suicidal ideation based on the ninth question of the PHQ9, which states the following: “Over the last 2 weeks, how often have you been bothered by thoughts

that you would be better off dead or of hurting yourself in some way?"

We used the Burnout Measure 10-item version (BMS) in this study to evaluate burnout. Each item is scored from 0 to 7 for a total score of 70. The final score is divided by 10; a score  $\geq 3.5$  indicates burnout [21].

The generalized anxiety disorder scale (GAD-7) is a 7-item scale used in clinical practice and research as a screening tool for anxiety. Scores of 5 to 9, 10 to 14, and  $\geq 15$  indicate mild, moderate, and severe anxiety, respectively. Using a score of 10 as a cutoff score yields a sensitivity of 89% and a specificity of 82% for detecting anxiety [22].

The alcohol use disorders identification test (AUDIT) is an instrument that screens for hazardous alcohol use. It is an internationally validated 10-item questionnaire covering the domains of alcohol consumption, drinking behavior, and alcohol-related problems. Each item is scored from 0 to 4. A score of  $\geq 8$  indicates hazardous use, with 92% sensitivity and 94% specificity [23]. For substance abuse screening we used the drug abuse screening test (DAST-10), a validated 10-item questionnaire that measures the extent of problems related to abuse. The total score can range from 0 to 10. DAST score interpretation is as follows: "0" no problem, "1 to 2" low-grade problem, "3 to 5" moderate, "6 to 8" moderately severe, and "9 to 10" severe problem [24].

The above questionnaires were administered in English. English is the official language of instruction at the AUBFM. All AUBFM medical students are fluent in English and proficiency in English is a requirement for admission. All of the above questionnaires have been validated in Arabic-speaking populations [21, 24–26].

## Statistical Methods

We used frequency distribution analysis to characterize the sample, to evaluate responses on attitude questions, and to calculate point prevalence for burnout, depression, suicidal ideation, anxiety, hazardous alcohol use, and illicit substance use.

In bivariate analysis, we tested 16 variables for association with burnout using Pearson's chi-squared or Fisher's exact test as indicated. Variables whose  $p$  value was  $< 0.25$  were entered in a multivariate logistic regression. We used the stepwise approach to identify significant associations while controlling for other variables.

We tested for any difference among the four medical school years comparing both categorical and continuous outcomes. We compared the mean total scores of BMS, PHQ9, GAD7, AUDIT, and DAST in the four medical school years by performing ANOVA with Bonferroni correction. We performed chi-squared tests to test for any difference among the 4 years in the frequency of participants screening positive on

BMS, PHQ9, GAD7, AUDIT, substance use, alcohol use, cannabis use, cigarette use, caffeine consumption, and suicidal ideation.

Chi-squared tests were also used to test for differences in attitudes toward substances and substance use rates among the 4 years.

In the missing data analysis, cases that had missing data in more than one variable were detected. Testing for missing at random pattern was done using the Missing Completely at Random (MCAR) test. Finally, we used imputation to the mode to replace remaining missing variables. Statistical analysis was performed using SPSS 23.0.0.0. For all analysis we have used a two-sided  $p$  value and an alpha level of less or equal to 0.05 for statistical significance.

## Results

The total number of medical students surveyed was 412; 176 responded for an overall response rate of 42.7%. Four surveys were disregarded because they were incomplete. For the remaining 172 surveys, the MCAR test resulted in a chi-squared = 1249.1 (df = 1291;  $p = 0.794$ ), indicating that missing values were distributed completely at random. The data from the 172 surveys were analyzed. Demographic and mental health characteristics of the sample are summarized in Table 1.

### Burnout, Depressive Symptoms, Suicidal Ideation, Anxiety Symptoms, and Substance Use: Point Prevalence

The frequency of participants that screened positive per our screening questionnaires was as follows: 74 participants (43.0%) screened positive for burnout, 41 participants (23.8%) reported depressive symptoms, and 39 participants (22.7%) reported anxiety. Suicidal ideation (during the last 2 weeks) was detected in 25 participants (14.5%).

One hundred participants (58.1%) responded positively regarding alcohol use. Among the 100 participants who drank alcohol, 16 met criteria for hazardous alcohol use per the AUDIT.

The question of "ever using an illicit drug" generated 60 affirmative responses (34.9%). Of those who ever used an illicit drug, the DAST scores revealed the following: 1 with a "severe problem" (1.7%), 5 with a "moderate problem" (8.3%), 26 with a "low grade problem" (43.3%), and 28 with "non-problematic use" (46.7%). The participants reported using a wide and varied range of substances, with cannabis being the most commonly used substance at 31.9%.

**Table 1** Selected sample characteristics and correlation with depressive symptoms and burnout

Variable	N = 172	Depressive symptoms (%)	p value	Burnout (%)	p value
Age (years)			0.44		0.82
20–25	75	26.7		44.0	
> 25	97	21.6		42.3	
Sex			0.01		0.03
Male	88	13.6		35.2	
Female	84	34.5		51.2	
Relationship status			0.69		0.73
Single	169			43.2	
Married	3			33.3	
Year of medical school			0.81		0.66
I	39	28.2		46.2	
II	30	26.7		36.7	
III	54	22.2		48.1	
IV	49	20.4		38.8	
Living arrangement			0.51		0.01
With parents	104	22.1		35.6	
On campus	68	26.5		54.4	
History of suicide attempt			0.00		0.06
Yes	8	62.5		75.0	
No	164	22.0		41.5	
Sleep duration			0.04		0.03
Less than 6 h	73	31.5		56.2	
More than 6 h	99	18.2		33.3	

### Evolution of Attitudes Regarding Substance Use During the 4 Years of Medical School

Table 2 summarizes the attitudes toward substance use among all participants. All the responses were compared among the 4 years of medical school using a chi-squared test. Only the item “Do you know a medical student who uses recreational drugs?” showed a significant difference between the four groups ( $\chi^2 = 15.46$ ,  $p = 0.001$ ). Students in the first year of medical school were less likely to know someone who uses recreational substances than students in the second, third, and fourth years of medical school.

### Correlates of Burnout and Associated Factors

Compared to medical students who were not burned out, those who screened positive for burnout were more likely to be males, to be living away from their parents, and to have experienced a stressful life event during the last year. The burned out students also tended to consume caffeine, “to self-prescribe psychotropic drugs,” “to use non-prescribed sedatives,” and to have suicidal ideation (Table 3). In addition to the above listed predictors, medical school year, “ever using illicit drugs,” alcohol use, being non-Lebanese, cigarette smoking, current use of mental health services, past use of

prescribed psychotropic, and history of self-harm or suicidal attempt were entered into a logistic regression model. The logistic regression model was statistically significant,  $\chi^2(16) = 74.78$ ,  $p < 0.001$ . The model explained 47.3% (Nagelkerke  $R^2$ ) of the variance in burnout.

Eight variables were significantly associated with an increased likelihood of having burnout: male gender O.R. = 2.3,  $p = 0.046$ ; not living with parents O.R. = 3.8,  $p = 0.004$ ; having experienced a negative life event in the past year O.R. = 3.2,  $p = 0.005$ ; sleeping less than 6 h/day O.R. = 2.8,  $p = 0.019$ ; having current suicidal ideation O.R. = 17.6,  $p < 0.001$ ; caffeine consumption O.R. = 2.6,  $p = 0.43$ ; self-prescribed psychotropic use O.R. = 15.0,  $p = 0.026$ ; and being a fourth year medical student versus being a first year medical student O.R. = 3.5,  $p = 0.038$ .

### The Effect of Medical School Year on the Variability of Our Findings

The difference between the 4 years of medical school was not significant for the mean total scores of PHQ9, GAD7, AUDIT, or DAST. Chi-squared analysis was performed to compare variability among year of medical school in suicidal ideation, cigarette smoking, caffeine use, alcohol use, illicit substance use, and cannabis use. There was no significant difference in suicidal ideation ( $\chi^2 = 0.29$ ,  $p = 0.962$ ), caffeine use, or

**Table 2** Attitudes regarding substance use among medical students

Question	Yes ( <i>N</i> = 172) (%)
1. Do you know a medical student who uses recreational drugs?	64.0
2. Is it OK to use recreational drug when on vacation or holiday?	52.9
3. Should cannabis be legalized?	48.8
4. If you have a recreational drug or alcohol related problem would you feel comfortable asking for help or sharing it with your medical school administration?	36.0
5. Is it acceptable for medical students to use recreational drugs?	29.7
6. Is it acceptable for physicians to use recreational drugs?	26.7
7. Do you think recreational drugs should be legalized?	26.0
8. Should the general public be allowed to use recreational drugs but not health care workers?	7.0

smoking ( $\chi^2 = 0.30$ ,  $p = 0.958$ ). There was a significant difference between the four medical school years in alcohol use ( $\chi^2 = 8.97$ ,  $p = 0.03$ ), illicit substance use ( $\chi^2 = 17.44$ ,  $p = 0.001$ ), and marijuana use ( $\chi^2 = 12.93$ ,  $p = 0.005$ ). In particular, first year medical students had lower rates of alcohol, illicit substance, and marijuana use than second, third, and fourth year students. For cigarette smoking ( $\chi^2 = 7.82$ ,  $p = 0.05$ ), the  $p$  value was on the limit of statistical significance.

**Table 3** Odds ratio (OR) of factors associated with burnout among medical students (*N* = 172)

Variable	OR	95% (CI)	
		Lower	Upper
Gender (female versus male)*	1.928403	1.045878	3.555613
Age group (20–25 versus 25 and above)	1.073171	0.584036	1.97195
Nationality (non-Lebanese versus Lebanese)	2.516129	0.938264	6.747465
Marital status (single versus married)	1.520833	0.135279	17.09751
Living with parents versus without parents*	0.462687	0.248001	0.863219
Stressful life event during last year (yes versus no)*	4.351852	2.283152	8.294942
Cigarette smoking (yes versus no)	2.053333	0.855669	4.927346
Water pipe smoking (yes versus no)	0.516667	0.097413	2.740333
Caffeine consumption (yes versus no)*	2.492788	1.202468	5.167700
Alcohol consumption (yes versus no)	0.821263	0.445646	1.513473
Illicit drugs ever use (yes versus no)	1.392832	0.740528	2.619724
History of suicidal attempt or self-harm (yes versus no)	4.235294	0.829672	21.62025
Marijuana use (yes versus no)	0.731616	0.385010	1.390254
Nonprescribed sedatives or benzodiazepines use (yes versus no)*	0.413174	0.344853	0.495030
Stimulant use (yes versus no)	0.741935	0.206676	2.663434
Sleep duration (less than 6 h versus more than 6 h)*	2.562500	1.374108	4.778668
Current suicidal ideation (yes over no)*	13.397436	3.827849	46.890906
Hazardous alcohol use (yes versus no)	0.647059	0.221203	1.892765
Current use of professional mental health services (yes versus no)	2.575385	0.825131	8.038244
Previous mental health diagnosis (yes versus no)	1.369231	0.515065	3.639915
Current use of any prescribed psychotropic (yes versus no)	1.809524	0.392433	8.34377
Past use of any prescribed psychotropic (yes versus no)	2.848485	0.823636	9.85127
Family history of recreational drug or alcohol use (yes versus no)	0.815217	0.255424	2.6018
Current or previous use of self-prescribed psychotropic (yes versus no) *	6.646154	1.390765	31.7604

\*Denotes statistical significance

## Discussion

Few studies have evaluated the mental health of medical students in Lebanon and the Middle East region. A multicenter study of US medical schools using the Maslach Burnout Inventory (MBI) reported the prevalence of burnout among medical students to be 55.9% [27]. European studies reported that the prevalence of burnout was significantly higher in sixth

year students (37.5%) compared with students in third year of training (14.8%) [28]. In Spanish medical students, 52.6% were found to have depersonalization and 33.6% reported emotional exhaustion [29], two essential components of burnout. The prevalence of burnout in this sample was 43.0%, which is within the reported range of burnout among medical students internationally [5, 27–31]. A previous study at our institution showed that 27.0% of residents met the criteria for burnout [14] and data from the region shows a prevalence of 23.0 to 31.0% of emotional exhaustion among nurses [32–34].

Prevalence of medical student burnout in this study exceeded both that of residents at the same institution and that of nurses in our region. This could be attributed to the academic and lifestyle demands required of medical students [35]. Medical students face a different set of challenges when compared to attending physicians, residents, or nurses. The stress of constant studying, clinical clerkships, frequent competitive examinations, social isolation from friends/family, and financial stressors is unique to medical students. Other factors such as being at the bottom of the medical hierarchy and potential abuse/bullying by senior individuals in the medical system are also likely exacerbating factors.

Male medical students were more likely to experience burnout in our study. This finding is not consistent with international data regarding burnout in medical students [28, 36–39]. Our sample was almost equally divided by gender (51.2% males and 48.8% females); female medical students in this sample appeared to be more resistant to burnout. This finding could be attributed to the relatively small sample size of the study. Most international studies reported that female medical students are more prone to burnout [28, 36, 38, 39].

Medical students not living with their parents were found to have an increased likelihood of burnout. This is consistent with previous research showing the importance of family support in reducing burnout among medical students [27, 38, 40, 41]. In our sample, this finding may have significant importance due to the societal norms in Lebanon (and the region) and the dynamics between parents and adult children, especially among those engaged in higher education.

Sleeping less than 6 h a night was associated with an increased likelihood of burnout among our medical students. Sleep deprivation has been shown to pose a significant risk on cognitive capabilities and on the performance of multiple tasks [42–44]. Only one previous study, to the best of our knowledge, has assessed sleep and burnout in medical students and has shown an inverse relationship between likelihood of burnout and sleep duration [45]. Being in the final year of medical school (fourth year) was found to be a predictor of burnout in this study. This is consistent with previous data showing a higher level of burnout among senior medical students [5, 28, 36, 46]. In addition to the academic, financial, and professional stressors that medical students have to face, final year medical students face the additional challenge of

getting accepted into residency (specialty training) programs. Joining a residency program is a highly competitive and stressful process that may exacerbate burnout in this particular population.

Medical students are more prone to suffer from depressive symptoms when compared to the general population. Among European medical students, 12.9% experience depressive symptoms and 2.7% attempt suicide [5, 47]. US data suggests a higher prevalence of 15.2%, with 20.0% of depressed medical students attempting suicide and 26.5% seeking treatment [13]. A Lebanese study examining the prevalence of depressive symptoms among medical students showed that 27.6% suffer from depressive symptoms and 69.0% suffer from anxiety [48]; both findings exceed the national prevalence rates for depression and anxiety [49]. In Lebanon, 22.0% of the residents surveyed by our group at the AUB medical center reported depressive symptomatology [14]. The prevalence of major depression in the general population in Lebanon has been found to range from 10.0 to 19.7% depending on age group [49, 50]. A study of Egyptian medical students found that 24.7% were suffering from depressive symptoms [51], which is similar to the prevalence in this sample (23.8%). The rate of depressive symptoms and suicidal ideation among medical students in this study is higher than that of the general and age-matched Lebanese population [49, 50] and higher than that of US and European medical students [5, 13, 47]. A high level of depressive symptoms was detected in this sample of medical students, with 14.5% of students experiencing suicidal ideation. This rate is higher than that of the residents at our institution and higher than that of the general Lebanese population [14, 52]. The socioeconomic and political situation in Lebanon is and has been chronically unstable for several decades [53]. This socioeconomic and political instability combined with a constant level of academic and financial stress may exacerbate depression and accelerate burnout [28, 35, 54, 55]. Additionally, many Lebanese medical students consider emigrating to continue medical training, adding a significant psychosocial burden on this group of vulnerable young adults.

Medical students are prone to developing symptoms of anxiety. The prevalence of anxiety among medical students was reported at 43.0% [56, 57]. Anxiety among the general Lebanese population was reported at 11.2% [52]. Anxiety symptoms among this sample of medical students were found to be more than double that of the Lebanese population (22.7%). However, this prevalence is lower than that of international data, which could be attributed to the relatively small sample size or the screening tool used [56, 57].

Alcohol abuse is a global public health concern that is also prevalent among medical students. In Lebanon, the prevalence of alcohol consumption among university students was found to be 49.4% [58], which is lower than the prevalence in this sample (58.1%). Additionally, 16.0% of the medical students in this sample were abusing alcohol, which is eight times more

than the average university population in Lebanon (2.1% abuse alcohol) [58]. The higher rate of alcohol abuse in medical students may be due to students using alcohol as a (negative) coping mechanism [11, 13, 27, 59]. The prevalence of serious or severe substance abuse in our sample (1.7%) was found to be lower than that of other university-level students in Lebanon (2.4–5.6%) [60, 61]. This could be attributed to a higher level of knowledge and awareness regarding SUD among medical students. The prevalence of substance abuse in this sample of medical students was found to be lower than the prevalence reported among medical students internationally [5, 62]. This can be attributed to the small sample size and possibly due to the high level of stigma associated with recreational substance use in Lebanese culture. It is possible that some participants in this sample were not comfortable disclosing their substance use. In a similar study by our group, only 2.5% of Lebanese residents had moderate substance abuse problems and none of them had severe problems [14].

This study showed a significant difference among the 4 years of medical school with regard to alcohol use, illicit substance use, and cannabis use. First year medical students had lower rates of alcohol, illicit substance, and cannabis use than second, third, and fourth year students. This trend of increasing rates in SUD as the students progress in their training is consistent with the literature [16, 63, 64]. Globally, this finding could be attributed to the increasing academic, professional, and financial stressors as medical students transition into the final clinical years which may lead to escalating alcohol and substance use [65].

Societal attitudes regarding substance use are constantly evolving and medical students reflect these changing societal norms. Twenty-six percent of medical students in this sample agreed that some recreational substances should be legalized. When asked if cannabis should be legalized, 48.8% responded “yes.” This finding is consistent with Western data [66, 67]. In the literature, factors predisposing to substance use among medical students include peer pressure, living away from home, and male gender [68–70]. It is worth noting the medical students’ attitudes toward substance use in this sample remained unchanged throughout the four medical years of medical school, with the exception of the question pertaining to “knowing any medical student who uses recreational drugs” (Table 2). In this sample, the views of the medical students regarding SUD during the 4 years remained unchanged despite their exposure to psychiatry and addiction medicine in the second and third years of medical school. One potential reason for this finding is attitudinal; some may believe recreational substance use is harmless; this could be particularly true for cannabis use. Young adults are exposed to a lot of data regarding the potential benefits of cannabis with minimal discussion on its potentially harmful effects [71, 72]. There are a number of limitations to our study. The main limitation is that this study was conducted as a cross-sectional study, which

does not allow us to evaluate causality or analyze a possible temporal relationship between outcomes. The study relied on questionnaires that are designed to detect symptoms and cannot diagnose clinical disorders. Another limitation is the sample size; a larger sample would have provided more robust associations among the examined variables, although the overall response rate of 42.7% is within what is usually expected for such studies. Persisting stigma in Lebanon regarding mental health could be a possible explanation for our response rate. Concerns about confidentiality and incomplete questionnaires seem to be major issues when surveying medical students and we also encountered these challenges [73]. No data was available regarding the non-responders. Self-selection bias is also a limitation and a concern. The sample in this study is reasonably representative of medical students in Lebanon and the region, since the study was conducted at one of the largest academic medical centers in the country, which attracts medical students from across Lebanon and the region.

In conclusion, the authors aim to increase awareness regarding the mental health challenges facing medical students internationally. An international perspective regarding these issues will enhance the overall understanding of burnout in medical education. It is crucial that medical educators and policy makers keep track of the complex multifactorial mental health issues affecting medical students. Developing effective solutions and support systems is crucial. Going forward, the authors plan to include medical schools from neighboring countries in the region, as well topics such as bullying, sexuality, spirituality, and parental/familial expectations in future burnout studies.

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**Compliance with Ethical Standards** The AUB institutional review board (IRB) reviewed and approved all aspects of this study. The authors complied with all the recommendations of the IRB to maintain confidentiality and anonymity of the participants. All enrolled medical students at the AUBFM were invited to participate.

**Ethical Considerations** The IRB committee at AUB approved this research project.

**Disclosures** On behalf of all authors, the corresponding author states that there is no conflict of interest.

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