



ORIGINAL ARTICLE

## Sources and Predictors of Stress among Medical Students in Jordan

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### ABSTRACT

*Excessive stress among medical students can lead to physical and mental health problems. Previous studies reported a high prevalence of stress among medical students. There are no published studies that examined stress and its predictors among medical students in Jordan. A cross-sectional survey that included students from four Jordanian medical faculties in the academic year of 2013/2014. The Medical Student Stressor Questionnaire (MSSQ) was used to assess stress levels on six domains of stressors. A total of 1,439 medical students were surveyed, 53% of them were females. More than half of students had moderate to severe stress on all domains. The highest reported stressors were academic with a prevalence of moderate to severe stress of 87%. Although there were some differences by domain, the common predictors for stress in our sample were female gender, presence of stressful social events, low socio-economic status, and being forced to study medicine. There is a high stress level among medical students in Jordan. There is an urgent need for health promotion programs to identify students at risk of moderate to severe stress and to provide the needed support for them.*

*Key words: stress, stressors, medical students, MSSQ, Jordan, Arab*

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### INTRODUCTION

Some might consider stress as a stimulus or a response. However, it is broader than this narrow definition. It is a process by which we perceive and cope with environmental threats and challenges [1].

Stress includes emotional disturbances or changes caused by stressors. Some investigators suggest that some degree of stress is needed for learning in medical school training [2]. They described stress that helps in the process of learning as 'favorable stress' and stress that negatively affects learning as 'unfavorable stress'.

The prevalence of stress among medical students was found to range from 30% to 50% [1-10]. Several predictors of stress have been identified as year of study [11], female gender [12, 13], and family socio-economic status [12,13]. Medical students may perceive and interact with the same stressors differently. This depends on various factors related to predictors of stress and the students' approach for coping with stress such as their cultural backgrounds, personal traits, experience, and coping skills [11, 14, 15].

Studies among medical students have shown that stress is associated with anxiety and depression [4, 5], suicide [16], drug abuse [17, 18], smoking and alcohol abuse [15, 19], interpersonal conflict [20], sleep disturbances [21], and poor academic or clinical performance [2]. Stress was also found to decrease attention, reduce concentration, impinge on decision making, and reduce students' abilities to establish good relationships with patients [4]. This could lead to feelings of inadequacy and dissatisfaction with clinical practice in the future not to mention the possibility of also affecting the lives of patients and the health of communities as a whole.

A study conducted in the United Kingdom using the General Health Questionnaire (GHQ) revealed that over one-third of medical students suffered from emotional disturbances [10]. A similar study conducted in a Malaysian university using the same instrument reported that 41.9% of medical students had emotional disorders [22]. A study conducted among female university students in Dammam, Saudi Arabia, using the Influence of Studying on Students' Health (ISSH) questionnaire showed that medical students were at higher risk of physical and mental health problems than non-medical students [23].

To the best of our knowledge, there have been no published studies that examined stress levels among medical students in Jordan. There is also no special system or program to support severely or highly stressed medical students at Jordanian universities. Therefore, we conducted this study to identify sources of stress, measure degree of stress related to different stressors, and search for predictors of stress among medical students in Jordan. The results could help in providing a basis for future stress-related health promotion programs for medical students in Jordan and in identifying modifiable risk factors that could be prevented in the future.

## METHODOLOGY

### Study Design and Settings

There are five medical faculties in Jordan located in the South, Middle, North, and East of the country. This cross-sectional survey included medical students from four of these faculties. Students from the fifth faculty, Yarmouk University in the northern region, were not included because this faculty was established in the year of 2013 and had only batch of first-year students. The included universities in this study were Mutah University (MU) in the southern region, the University of Jordan (UJ) in the middle region, the Jordan University of Science and Technology (JUST) in the northern region, and the Hashemite University (HU) in the eastern region. This study was approved by the Scientific and the Ethics Committees of the Faculty of Medicine at [University name removed to insure anonymity of the manuscript]. Approvals for data collection were obtained from the deanships of the faculties of medicine in the participating universities.

### Sample Size

At the time of data collection, the number of students at MU, UJ, JUST, and HU were 1,229; 1,665; 3,571; and 1,432, respectively. Using the Kish formula for sample size calculation at a 95% significance level and a 5% error margin, it was required to sample 396, 342, 377, and 333 students from MU, UJ, JUST, and HU, respectively [24]. Since academic year is one of the predictors of stress level [25], representative samples were calculated according to the proportion of medical students in each year from the total number of medical students at each university.

### Study Questionnaire

Data were collected using a questionnaire in the English language as this is the language of teaching at Jordanian medical schools. After discussions with randomly selected students, the Arabic translation of hard-perceived words was added.

The questionnaire comprised of four parts: (1) Demographic-related questions, (2) socio-economic factors, (3) motivation to study medicine, and (4) the Medical Student Stressor Questionnaire (MSSQ). The first three parts of the questionnaire were based on literature review and discussions with faculty members and students. The first section covered general background information such as gender, age, residence of parents, and academic year. It also assessed smoking status and presence of chronic illnesses. The second section covered socio-economic factors such as monthly family income, educational level of the parents, while the third section consisted of three questions on the student's motivation to study medicine. Finally, the fourth section included the MSSQ [26]. The MSSQ was developed to identify sources of stress among medical students. The items of this questionnaire represent 40 events that have been reported to be possible sources of stress in medical students. These items represent six stressor domains, as listed below. This questionnaire was validated through a study that included 761 medical students representing multiple ethnicities, religions, and cultures. The results showed that the MSSQ has good psychometric properties and that it is a valid and reliable instrument that could be used to detect medical students' stressors and as well as measure the magnitude of the identified stressors [27]. Permission for use was obtained from the author of this questionnaire (Prof. Muhamad Yusoff).

- Domain I: Academic Related Stressor (ARS)
- Domain II: Interpersonal and Intrapersonal Related Stressor (IRS)
- Domain III: Teaching and Learning Related Stressor (TLRS)
- Domain IV: Social Related Stressor (SRS)
- Domain V: Drive and Desire Related Stressor (DRS)
- Domain VI: Group Activities Related Stressor (GARS)

For each of the six domains, stress is categorized into four groups, as follows:

- 0 – 1.00 = Causes mild stress
- 1.01 – 2.00 = Causes moderate stress
- 2.01 – 3.00 = Causes high stress
- 3.01 – 4.00 = Causes severe stress

The final version of the questionnaire was piloted in the four participating medical schools and was found to be adequate for the population of medical students in Jordan.

### **Sample Collection**

Data collection took place in the second and summer semesters of the academic year of 2013/2014. Data was collected at least two weeks after the start of the term and not during exams periods in order to avoid any effects of holidays or exams on the responses.

Research assistants, who were medical students, helped us in the data collection after receiving training on the questionnaire and the data collection methodology. A multistage sampling technique was used for data collection. A random sample was then selected from each academic year at different weekdays and times of day to avoid convenience sampling. Students were approached before and after lectures, seminars, and clinical rotations and the goals of the study were explained to them and any questions they had were answered. Those who consented to participate in this study were then given the study questionnaire and instructed to fill it without discussing it with their colleagues.

### **Statistical Methods**

Data analysis was carried out using SPSS software version 20.0 (SPSS; Chicago, IL, USA). Descriptive statistics were obtained and reported as necessary. For the performed statistical analysis, a significance level of 0.05 was assumed. A summary of stress level among students was reported. Chi-squared testing procedure will be performed to test for association between the study factors and stress level of students. A regression model was built through stepwise selection. Selection parameters used were alpha to enter of 0.05 and alpha to remove of 0.1.

To incorporate socio-economic status in the analysis, a Socioeconomic Index (SEI) was calculated following the suggestions of Hollingshead(28). A total score was calculated for each student based on four factors: (1) area of residence (being a village, town, or city), (2) education of father (at six levels), (3) education of mother (at six levels), and (4) monthly family income (at five levels). These total scores were then discretized into three categories of equal frequency forming the SEI. The three categories were low (12–40), medium (41–53), and high (54–76).

## **RESULTS**

### **Demographic Characteristics**

This national survey included 1,439 students from the four participating medical schools. Socio-demographic data of the students are summarized in Table 1. Females constituted 53.3% of the sample. Most of the students were Jordanians (86.6%), Muslim (95.3%), and single (99%). The SEI analysis showed that 33.3% of students fell within the high SEI category, 32.0% within the medium SEI category, while the remaining (34.7%) were within the low SEI category.

Away from medical school, 23.7% of the students reported having social events making them stressed.

### **Motivation to Study Medicine**

Figure 1 summarizes the students' responses to statements regarding their motivation to study medicine. It shows that 79.2% of the students strongly agreed/agreed that they were interested to study medicine, while 16.4% of them were neutral, and the remaining (4.4%) strongly disagreed/disagreed. Around half of the students (46.1%) strongly agreed/agreed that their decision to study medicine had been influenced by their families, while 30.5% were neutral, and 23.4% strongly disagreed/disagreed. Finally, 21.4% of students strongly agreed/agreed with the statement that they had no choice but to study medicine, while 20% of them were neutral, and 58.5% of them strongly disagreed/disagreed.

### **Sources of Stress Using the MSSQ**

Sources of stress by the six domains of the MSSQ are shown in Figure 2. The highest reported stressors were academic related with 86.7% of students having moderate to severe stress on this domain. On the other hand, the lowest reported stressors were drive- and desire-related stressors with 62.9% of students detected with moderate to severe stress on this domain. The ranges of moderate to severe stress stressors are teaching and learning related, interpersonal and intrapersonal related, social related, and group activities related were 84.2%, 84.0%, 83.2%, and 80.8%, respectively.

Table 1: Demographic characteristics

		Frequency	Percent
<b>University (n = 1439)</b>	Mutah University	396	27.5
	University of Jordan	342	23.8
	Jordan University of Science and Technology	377	26.2
	Hashemite University	324	22.5
<b>Academic year (n = 1439)</b>	First	373	25.9
	Second	271	18.8
	Third	240	16.7
	Fourth	202	14.0
	Fifth	206	14.3
	Sixth	147	10.2
<b>Gender (n = 1438)</b>	Male	671	46.7
	Female	767	53.3
<b>Nationality (n = 1437)</b>	Jordanian	1244	86.6
	Non-Jordanian	193	13.4
<b>Religion (n =1437)</b>	Muslim	1369	95.3
	Christian	62	4.3
	Other	6	0.4
<b>Marital status (n = 1438)</b>	Single	1424	99.0
	Married	14	1.0
<b>Socioeconomic Index (n =1364)</b>	Low	473	34.7
	Medium	437	32.0
	High	454	33.3

### Predictors of Stress Scores

The significant predictors of high scores in the academic related stressors domain were female gender ( $P = 0.031$ ), low SEI ( $P = 0.016$ ), having stressful social events ( $P = 0.004$ ), and being forced to study medicine ( $P < 0.001$ ). Being a fifth-year medical student was associated with lower stress scores compared with other years ( $P = 0.039$ ).

With respect to interpersonal- and intrapersonal-related stressors, the significant predictors of high stress scores in this domain were being a second- or a fifth-year student ( $P = 0.004$ ), male gender ( $P = 0.025$ ), low SEI ( $P = 0.012$ ), having stressful social events ( $P = 0.019$ ), and being forced to study medicine ( $P < 0.001$ ).

Regarding the teaching- and learning- related stressors, the significant predictors of high stress scores in this domain were having low SEI ( $P = 0.032$ ), having stressful social events ( $P = 0.004$ ), and being forced to study medicine ( $P = 0.001$ ).

Regarding the social-related stressors, the significant predictors were female gender ( $P < 0.001$ ), low SEI ( $P = 0.019$ ), having stressful social events ( $P = 0.031$ ), and being forced to study medicine ( $P = 0.001$ ).

For the drive- and desire-related stressors, the predictors of high stress scores were having stressful social events ( $P = 0.01$ ) and being forced to study medicine ( $P < 0.001$ ). Fifth year students had lower social related stress score than the remaining students ( $P = 0.003$ ).

For the sixth and last section (the group activity-related stressors), the identified significant predictors of high stress scores were being a fourth-year student ( $P = 0.018$ ), female gender ( $P = 0.018$ ), having stressful social events ( $P < 0.001$ ), and being forced to study medicine ( $P < 0.001$ ).

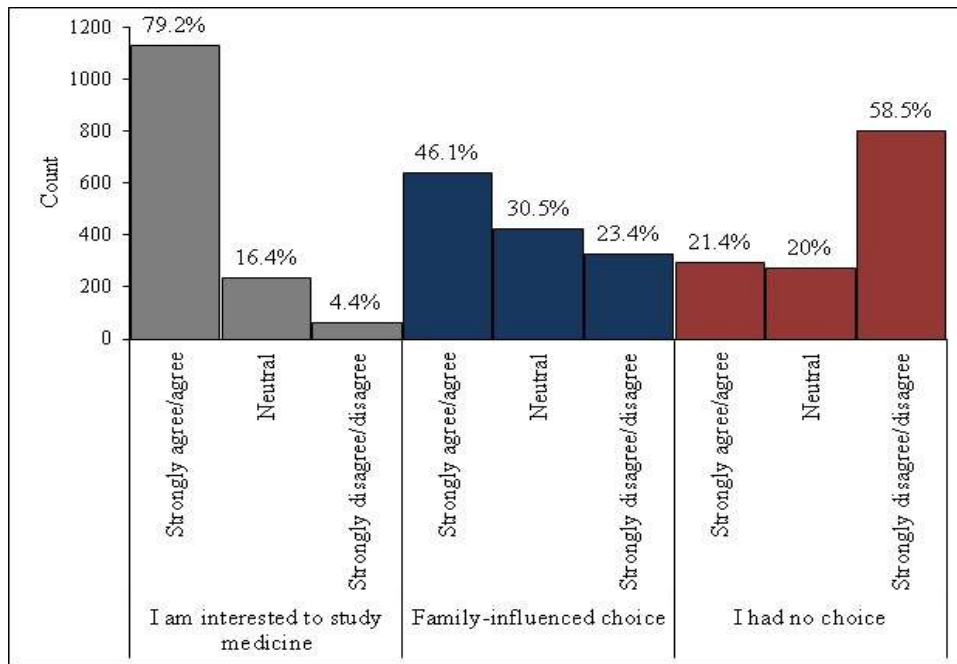


Figure 1: Motivation to study medicine. Bars represent the frequency of students while labels represent the relative percentage of the total students who answered the question.

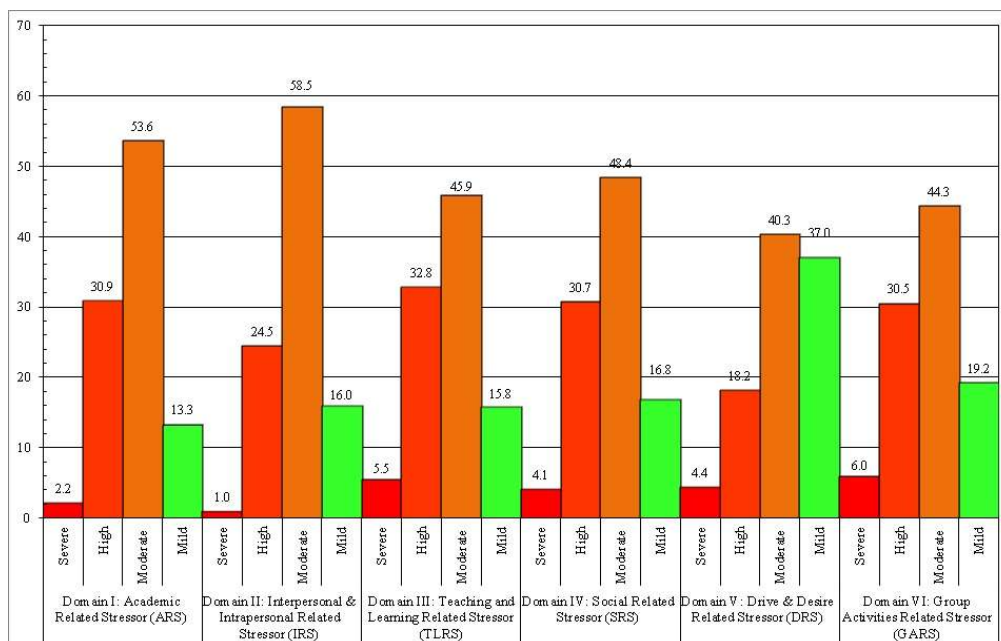


Figure 2: Percentages of students categorized as having mild, moderate, high, or severe stress for the six domains.

**DISCUSSION**

This large survey among medical students in Jordan showed that there is a high stress level in all the studied stressors (more than half of students were found to have moderate to severe stress in all domains). These results are consistent with previous studies that also reported a high prevalence of stress among medical students, ranging from 30% to 50% [6-10]. A meta-analysis of 40 studies concluded that the overall psychological distress and prevalence rates of depression and anxiety among medical students are higher than non-medical students or age-matched peers from the general population [29]. In Jordan, a previous study which examined the level of burnout among 307 clinical dental students in two Jordanian universities found high levels of emotional exhaustion and depersonalization [30]. These results and ours are alarming because of the negative consequences of high stress on the students, and additionally, because of the potential future negative consequences on patients and the health care system in general.

In western countries, such as the United Kingdom, Canada, and the USA., the problem of stress among medical students has been carefully considered in terms of early detection and prevention programs [31,32]. In the United Kingdom, for example, the General Medical Council (GMC) recommends that medical schools should have procedures to detect symptoms of stress as early as possible [33]. However, in countries like Jordan, such programs are lacking.

The highest reported stressors in this study were in the academic domain. There are many potential academic- and learning-related stressors for medical students. Medical students are expected to learn a considerable amount of knowledge and to master many skills. This is in addition to other requirements such as reports, assignments, frequent assessments, and overnight duties for students in clinical years [34].

In our study, 2.2% and 30.9% of the students had severe and high stress in the academic domain, respectively. These figures are higher than figures reported in a study from India that also used the MSSQ (24% and 1%, respectively). However, these figures are much lower than figures reported in a Malaysian study, also using the MSSQ (84.0% and 15.5%, respectively). None of the students in Malaysia had mild stress on the academic stressors compared to 13.3% of Jordanian medical students. There are however differences between this study and the Malaysian study in the proportion of students in each academic year. Around half of students in the Malaysian study (46%) were first-year students and the rest were second- and third-year students, while in our study only 25.9% of the students were first-year students, while the rest were distributed over the remaining five academic years according their proportion in each academic year. The differences in the proportion of students in the different academic years between these two studies could justify the observed differences as stress among medical students was found to decrease as they advance in their studies [25]. Furthermore, in the Malaysian study females constituted 72% of the sample, while in our study females constituted only 53.3% of the sample. This difference in the proportion of females could also justify some of the differences between these two studies, as there is evidence from studies on medical students that female gender is associated with more stress than male gender [35].

Another important finding in this study is that more than one-third of students were detected with severe or high stress in all but the drive- and desire-related stressors domain. The highest proportion was for the teaching- and learning-related stressors followed by social-related stressors. This indicates that these stressors also need special attention in stress reduction programs because they are associated with high and severe stress levels. Similar to the above findings, our results are lower than detected in India but close to results detected in Malaysia. Only 13% and 12% of students had high stress on the previous two domains in the Indian study, respectively. Yet, none of the Indian students had severe stress on these two domains, compared to 36% and 20% of Malaysian students with severe stress and 38% and 49% with high stress on these two domains, respectively.

The lowest reported rate for moderate to severe stress was for drive- and desire-related stressors with 63% of students having moderate to severe stress and only 22.6% of them having high or severe stress. This domain was also the lowest rate of moderate to severe stress in the Malaysian and Indian studies. Similar to the previous comparisons, the scores from India were lower than the scores in our study but those from Malaysia were higher. Only 10% of students in the Indian study scored high or severe on this domain compared to 41% of students in the Malaysian study [36].

Around half of student (46.1%) agreed or strongly agreed that their decision to study medicine was influenced by family choice. This is consistent with a recent study from Saudi Arabia where 53.1% of the students reported that their families influenced their decision to study medicine [37]. With 79.2% of the students strongly agreeing/agreeing that they were interested to study medicine, this indicates that there is very good self-motivation to study medicine in Jordan. However, 4.4% of the students indicated lack of interest in studying medicine. We did not investigate this area further because our aim was to assess the effect of motivation on different stressors. Previous studies showed that decision to study medicine is a complex decision of intrinsic and extrinsic factors such as desire to help others, interest in medicine, family influence, and socio-economic status [38-40].

We identified several predictors for high or severe stress scores in our study. Although there were differences by domain, the following were common predictors for stress in our sample female gender, fourth academic year, having stressful social events, low socio-economic status, and being forced to study medicine. In a study from Malaysia, the year of study was the only statistically significant predictor of stress scores [25]. Another study from Malaysia identified the following significant predictors of high stress level: female gender, Buddhist religion compared to Islam, absence of financial support, and being in a love relationship [41].

The relationship between academic year and stressors was inconsistent in our study and this is in accordance with other studies in which different phases of medical education were found to be associated with different stressors [42, 43].

In our study, female students had higher stress scores than male students in response to academic stressors and this is consistent with other studies [25]. However, some studies could not establish this relationship [6,21,44]. It has been suggested that females are more likely to report stress and concerns due to self-expectations, feelings of lack of competences, and the potential to over report symptoms [45,46].

Our results revealed that students with low socio-economic status are more stressed than other students; a result consistent with the outcomes of previous studies [12,13]. These students have continuous worries about the cost of living and education when they come from low socio-economic backgrounds. According to one of the US national surveys, 35% of the students described their finances as "traumatic" and 9% of them reported that this had affected their academic performance [47]. In another survey, one-third of the students stated that financial constraints negatively affected their academic performance [48].

Having "Stressful social events" was another important predictor for high stressor scores in our study. Students' families and the university should work together to support students under social stressful events, such as a recent loss or severe illness of a relative or a loved one. In our study, around one-quarter of the students (23.7%) reported the presence of such events in their lives. Unfortunately, there is no formal social support for students at Jordanian universities.

A previous Jordanian study on the relation between social status and stress among university students failed to identify risk factors for stress among the students [49]. That study showed that there is no significant difference among university students related to age, academic year, student's faculty, parental divorce, and parental separation, smoking cigarettes, drinking coffee, or drinking tea. The discrepancy between the results of this study conducted among university students from all faculties and our study could indicate that the risk factors for stress could be different based on faculty.

## CONCLUSION AND RECOMMENDATIONS

There is a high stress level among medical students in Jordan as shown in all the studied stressors with the highest levels for the academic-related stressors. More than half of students reported moderate to severe stress on all domains. In view of the absence of any program directed toward relieving stress among medical students in Jordan, there is an urgent need for health promotion programs at medical schools in Jordan that prevent and control modifiable stressors and identify students with moderate to severe stress, and hence enable them to cope better with stress.

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