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Stress, Anxiety, and Depression in Pre-Clinical Medical Students: Prevalence and Association with Sleep Disorders

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Abstract: Our aim was to assess sleep quality in different subgroups of preclinical medical students, and then to identify specific lifestyle factors, academic and social factors as well as Corona virus related factors that were associated with poor sleeping quality and poor psychological health. Study participants were all medical students at King Saud University of Medical Sciences in the first and second years (648 students), and the study was conducted from December 2021 to January 2022. We administered the survey on paper as well as online. We used three types of questionnaires in this study. The first was a self-administered questionnaire, the second was a validated Insomnia Severity Index (ISI) for finding sleeping problems, and the third was a validated DASS 10 for determining Depression, Anxiety, and Stress. A total of 361 pre-clinical medical students consisted of 146 (40.4%) males and 215 (59.5%) females. The majority of the students, 246 (68.1%), were in their second year. Furthermore, in the current study, students who had poor academic performance (15.8%), satisfactory academic performance (21.3%), or good academic performance (30.7%) had significant sleeping problems found (χ^2 = 19.4; p = 0.001), among them poor academic performance students 21.6%, satisfactory academic performance students (29.3%), and good academic performance students (29.3%) had moderate to severe levelled sleeping problems. Similarly, poor, satisfactory, and good academic performers experienced the highest levels of anxiety (poor = 21.5%; satisfactory = 22.1%; and good = 22.8%); stress (poor = 22.4%; satisfactory = 25.2%; and good = 22.4%); and depression (poor = 40.5%; satisfactory = 40.5%; and good = 11.9%). The majority of students (64.8%) reported that during the pandemic crisis their anxiety levels were high. Additionally, students reported significantly high sleeping issues (χ^2 = 10.6; p = 0.001) and also serious psychological issues (Anxiety = 34.9 (0.000); Stress = 32.5 (0.000); and Depression = 5.42 (0.01)). There was a high prevalence of sleep issues, anxiety, stress, and depression among the pre-clinical medical students, with significantly higher sleeping disorders, anxiety, stress, and depression levels among those medical students who struggle with their academic performances, poor lifestyle factor, and poor Social and COVID management.

Keywords: medical students; stress and anxiety; research methods; school environment

Citation: Alrashed, F.A.; Alsubiheen, A.M.; Alshammari, H.; Mazi, S.I.; Al-Saud, S.A.; Alayoubi, S.; Kachanathu, S.J.; Albarrati, A.; Aldaihan, M.M.; Ahmad, T.; et al. Stress, Anxiety, and Depression in Pre-Clinical Medical Students: Prevalence and Association with Sleep Disorders. *Sustainability* **2022**, *14*, 11320. https://doi.org/10.3390/su141811320

Academic Editors: Ashutosh Sharma, Gennady E. Veselov, Alexey Tselykh and Byung-Gyu Kim

Received: 2 June 2022
Accepted: 6 September 2022
Published: 9 September 2022

1. Introduction

The period of pre-clinical education is critical for students to acquire the knowledge and experience which will be useful for the rest of their education and careers. Therefore, this period has to be accompanied by total mental and physical well-being. Furthermore, students who are overburdened with academic work are much more likely to experience various sleep problems and their consequences. The prevalence of daytime sleepiness among students is estimated to be about 50%, but only 36% among the general population [1]. The results of another study revealed that 40.6% of medical students have poor sleep quality [2]. Poor sleep quality and quantity can be attributed to several lifestyle behaviors, environmental factors, and psychological influences. It is believed that there are a variety of behaviors that contribute to a good night's sleep, especially if they are practiced regularly. Incompatible behaviors with good sleep include alcohol consumption, caffeine, energy drinks, stimulants, and frequent use of technology before bed [3,4]. In previous studies, poor sleep quality was associated with conditions such as living in dormitories [5,6]. Sleep disorders such as insomnia have been associated with psychological problems such as depression, anxiety, and stress [7].

In addition to many mental health issues, insomnia is also commonplace in the general population, with about a third of adults experiencing some form of insomnia [8]. Sleep problems, such as insomnia, often cause sleep difficulties and irritability or fatigue during the daytime [9]. Stress, anxiety, and depression among medical students are major health issues in the world today. In order to prepare for a lifelong career in medicine, medical students need to acquire the necessary knowledge, skills, and attitudes. However, learning and educational demands can have a negative impact on student's physical and mental health. In general, medical students suffer more psychological distress than the general population due to this situation, and they are more likely to have depression, anxiety, and stress [10]. Medical students are typically one of the subgroups of the general population that are more prone to insufficient sleep due to the long study hours, intense study load, and pre-clinical responsibilities [11]. Medical students may experience depression, anxiety, or stress for several reasons. psychological factors classified as many reasons such as socio-demographic, life risk or chronic illness, academic issue etc. [12,13]. In addition, these factors include a comprehensive medical curriculum, a long course schedule, concerns about academic performance, high family expectations, and socio-demographic characteristics. Depression, anxiety, stress, poor sleep quality, low academic performance, alcohol and drug abuse, a loss of self-confidence, poor life quality, and psychiatric illnesses can result from these stress factors [14].

Researchers in Egypt and around the region have conducted studies that demonstrate high levels of anxiety and depression in medical students during their training and study years. In Egypt, 164 medical students and 164 pharmacy students were recently studied through a cross-sectional study at Alexandria University. According to this study, health students are more likely to suffer from anxiety and depression than pharmacy students, and the prevalence of anxiety and depression among medical students is higher than that among pharmacy students [15]. There are also similar findings in the region, as one study of 50 medical students is reported to have revealed a stress prevalence of 53% at the Faculty of Medicine, King Faisal University, Al Ahsaa region, Saudi Arabia [16]. Among students studied in a meta-analysis of 35 studies with a sample size of 9743, depression was found to occur at a rate of 33% (95% CI: 32–34%); male students were significantly more likely to suffer from depression than female students [17].

COVID-19 has certainly had a widespread effect, resulting in many schools cancelling clinical teaching. To flatten the curve, one purpose is to minimize personal interactions, thereby containing and mitigating the spread of COVID-19. At this disastrous time due to COVID-19 pandemic, medical students who were already overburdened in the pre-pandemic era and who had poorer psychological wellbeing standing are being targeted directly [18]. These interventions have impacted the lives of students in different ways, depending on where they are in their studies as well as their level and course. Globally,

there has been much anxiety and fear surrounding the COVID-19 pandemic and its potential transmission [19,20].

Due to the already highly competitive nature of medical and dental training, academic pressure, exposure to patients in clinical settings, financial constraints, and lack of sleep, medical and dental students are psychologically vulnerable groups during these unprecedented times. This may already contribute to psychological problems associated with stress and anxiety [21]. In addition, healthcare students are considered to be at greater risk of infection during outbreaks due to their higher risk of being exposed to the virus during clinical training [22,23]. As a result, medical students have reported more anxiety during previous disease outbreaks than non-medical students, especially due to their fears of transmitting the virus back to their families and loved ones [24]. Medical students' sleeping and psychological factors have been studied extensively in Saudi Arabia. We believe that medical students' sleeping and psychological factors have improved and come with positive outcomes in Saudi Arabia. To the best of our knowledge, no comprehensive study has examined the psychosocial effects of sleep and its association with socio-demographic, academic, and COVID factors among medical students at pre-clinical stages. Our aim was to assess sleep quality in different subgroups of preclinical medical students, and then to identify specific lifestyle factors, academic and social factors as well as Corona virus related factors that were associated with poor sleeping quality and poor psychological health.

2. Methods

Process and Conduction

Study participants were all medical students at King Saud University of Medical Sciences in the first and second years (648 students), and the study was conducted from December 2021 to January 2022. The students at this level of education are in their preclinical training and don't have night calls or shifts. We administered the survey on paper as well as online. The time for distribution of the self-administered questionnaires was carefully chosen considering the schedules of the students so that there would be no exams in the weeks before and after the questionnaires were distributed. The sampling method was convenient and participants in this study had the freedom to participate at their convenience and time, and all participants in the study were voluntary. It was guaranteed that confidentiality was maintained, and whoever consented to participate and provide feedback had their privacy protected. King Saud University of Medical Sciences' institutional review board and ethics committee approved the study protocol.

3. Instrument

We used three types of questionnaires in this study. The first was a self-administered questionnaire, the second was a validated Insomnia Severity Index (ISI) for finding sleeping problems, and the third was a validated DASS 10 for determining Depression, Anxiety, and Stress.

A self-administered questionnaire was designed after an exhaustive literature review to achieve the study's objectives related to risk factors associated with depression, anxiety, stress and sleeping problem. The prepared version contained 10 elements subjected to detailed debate among a panel of three medical psychological and medical education clinical consulting team members with substantial expertise dealing with psychological wellbeing and education fields. After two meetings and considerable discussion, the panel agreed on nine items from the demographic factor, eight items from the academic factor, six items from the lifestyle factor, and nine items from the social and Coronavirus factor. A pilot study must be conducted before the final study, based on the advice of the consulting team and the ethical review board. It was decided to conduct a pilot study with risk factors questionnaires for 20 to 35 participants. A pilot study was conducted in the college of medicine first and second-year students in Riyadh city from 26th October to 3rd November 2021 with 31 participants. The reliability (alpha) of demographic factor r = 0.783, academic

factor r = 0.831, lifestyle factor r = 0.816, and social and Coronavirus factor r = 0.82 have been found to be reliable after the pilot study, which we reported to the Ethics Committee.

3.1. Insomnia Severity Index (ISI)

There are seven questions on the Insomnia Severity Index. Scores are calculated by adding the seven answers. Bastien et al., 2001, used the Insomnia Severity Index (ISI) to collect responses regarding sleep [25]. It consists of seven items on a five-point Likert scale. Scores ranged from 0 to 28 for each respondent (absence of insomnia (0–7); sub-threshold insomnia (8–14); moderate insomnia (15–21); and severe insomnia (22–28)) scale. The higher the score, the more severe the symptoms of insomnia. Based on Bastien et al., 2001 and Morin et al., 2011, a cumulative score of $\geq$8 indicates a participant has insomnia symptoms [25]. The reliability (alpha) of ISI r = 0.872 found after the pilot study.

3.2. Depression, Anxiety, and Stress (DASS 10)

Mental health was assessed by using the Depression, Anxiety, and Stress Scale-10 (DASS-10). Each of the following subscales will be considered normal (0–4), mild (5–8), moderate (9–12), and severe (13–16) for Depression. Anxiety and Stress are considered normal and mild (0–4), moderate (5–8), and severe (9–12) [26,27]. The overall reliability coefficient (Cronbach's alpha) for the total score was 0.89, while the individual values for depression, anxiety, and stress were 0.86, 0.84, and 0.88, respectively. In this study, a reliability coefficient of 0.88 was calculated for the questionnaire.

4. Statistical Analysis

The data entry and evaluation were performed using SPSS Statistics 22.0 (IBM Corporation, Armonk, NY, USA), and the data entry was accomplished with Microsoft Excel. To estimate the prevalence of a result variable, a 95% confidence interval was used. Pearson's chi-square test and odds ratios (ORs) were used to estimate correlations between a definite outcome and the variables under consideration. Data were entered using Microsoft Excel.

5. Results

The demographic information of the current study participants includes gender, age, living situation, academic year, etc. A total of 648 first- and second-year medical students were invited to participate in this study. In 1 month of 23 days, we received 389 student responses both through paper and online. Upon careful evaluation, a total of 361 responses with a response rate of 55.7% were received and included in the study. A total of 361 preclinical medical students consisted of 146 (40.4%) males and 215 (59.5%) females. The majority of the students, 246 (68.1%), were in their second year. There are 21.1% of students who live on campus and 78.9% who live off-campus with family and friends. A majority of students 62.3% said they were not happy as compared with their classmates. There have been no reports of psychological illness from 91.4% of the students so far. Students reporting insomnia or sleeping problems are as follows: no sleeping problems 91 (25.2%), mild sleeping problems 154 (42.7%), moderate sleeping problems 100 (27.5%), and severe sleeping problems 16 (4.4%). For identifying anxiety symptoms, stress, and depression in students, we used DASS10 and found that 212 (58.7%) students had mild anxiety, 140 (38.8%) students had moderate anxiety, and 9 (2.5%) students had severe anxiety among preclinical medical students. Stress: mild stress was reported to be 254 (70.4%) students, moderate stress was reported to be 103 (28.5%) students, and severe stress was reported by 4 (1.1%) students. Depression was reported to be mild in 200 students (55.4%), moderate 119 students (33.0%), and severe in 42 students (11.6%) (Table 1).

Table 1. Demographic information of study participants.

Item	Categories	n (%)
Gender	Male	146 (40.4)
	Female	215 (59.6)
Ages	17–20	241 (66.8)
	21–23	120 (33.2)
Academic year	1st Year	115 (31.9)
	2nd Year	246 (68.1)
Living situation	In Campus	76 (21.1)
	Off campus	285 (78.9)
Chronic illness	No	350 (97.0)
	Yes	11 (3.0)
Do you see happier than your classmates?	No	225 (62.3)
	Yes	136 (37.7)
Do you manage to solve difficult problems?	No	50 (13.9)
	Yes	311 (86.1)
Diagnosed with a psychological illness	No	330 (91.4)
	Prefer not to say	12 (3.3)
	Yes	19 (5.3)
Taken any non-prescribed drugs recently cope with stress	No	319 (87.8)
	Yes	42 (11.6)
Insomnia Severity	No clinically significant insomnia	91 (25.2)
	Mild insomnia	154 (42.7)
	Clinical insomnia (moderate severity)	100 (27.7)
	Clinical insomnia (severe)	16 (4.4)
DASS-10		
Anxiety	Mild	212 (58.7)
	Moderate	140 (38.8)
	Sever	9 (2.5)
Stress	Mild	254 (70.4)
	Moderate	103 (28.5)
	Sever	4 (1.1)
Depression	Mild	200 (55.4)
	Moderate	119 (33.0)
	Sever	42 (11.6)

In comparison with male students, female medical students reported more sleeping problems by 1.34 (OR = 1.34; $p = 0.19$). There is a higher rate of sleep problems among medical students aged 21 to 23 (OR = 1.13; $p = 0.55$) than among younger students. Sleeping problems are 2.04 times as common among students with chronic illness (OR = 2.04; $p = 0.14$). Additionally, students who believe they are not happier as compared with their classmates have significantly higher sleeping issues (OR = 1.8; $p = 0.01$). Furthermore, those students do not solve the academic problem by themselves and they have more 1.2 times high sleeping problem. In addition, the use of prescribed drugs to cope the stress

among said students is higher (~1.4 times) and sleeping issues are found in the current study (Table 2).

Table 2. Overall sleeping issues in medical students with demographic information.

Participants	Total n (%)	* No n (%)	OR (95% CI)	*p*-Value	* Yes n (%)	OR (95% CI)	*p*-Value
Gender							
Male	146 (40.4)	107 (73.3)	I		39 (26.7)	I	
Female	215 (59.6)	138 (64.2)	0.87 (0.63–1.21)	0.48	77 (35.8)	1.34 (0.86–2.07)	0.19
Ages							
17–20	241 (66.8)	167 (69.2)	I		74 (30.7)	I	
21–23	120 (33.2)	78 (65)	0.93 (0.66–1.32)	0.71	42 (35)	1.13 (0.73–1.76)	0.55
Academic year							
1st year	115 (31.9)	69 (60.0)	0.83 (0.58–1.19)	0.33	46 (40.0)	1.22 (0.78–1.91)	0.37
2nd year	246 (68.1)	176 (71.5)	I		70 (28.5)	I	
Living situation							
In campus	76 (21.1)	51 (67.1)	0.98 (0.66–1.46)	0.94	25 (32.9)	1.03 (0.61–1.7)	0.90
Off campus	285 (78.9)	194 (68.0)	I		91 (31.9)	I	
Chronic illness							
No	350 (97.0)	241 (68.8)	I		109 (45.2)	I	
Yes	11 (3.0)	4 (36.4)	0.52 (0.16–1.67)	0.27	7 (63.6)	2.04 (0.77–5.39)	0.14
Do you see happier than your classmates							
No	225 (62.3)	138 (61.3)	077 (0.56–1.08)	0.13	87 (38.6)	1.8 (1.13–2.90)	0.01
Yes	136 (37.7)	107 (78.7)	I		29 (21.3)	I	
Do you manage to solve difficult problems							
No	50 (13.9)	31 (62)	0.90 (0.55–1.45)	0.67	19 (38.0)	1.2 (0.68–2.16)	0.50
Yes	311 (86)	214 (68.8)	I		97 (31.2)	I	
Diagnosed with a psychological illness							
No	330 (91.4)	225 (68.2)	1.02 (0.41–2.54)	0.96	105 (31.8)	0.95 (0.30–3.02)	0.93
Prefer not to say	12 (3.3)	8 (66.6)	I		4 (33.3)	I	
Yes	19 (5.3)	12 (63.1)	0.94 (0.30–2.99)	0.92	7 (58.3)	1.10 (0.26–4.5)	0.89
Taken any non-prescribed drugs recently cope with stress							
No	319 (87.8)	221 (69.2)	I		98 (30.7)	I	
Yes	42 (11.6)	24 (57.1)	0.82 (0.48–1.40)	0.47	18 (42.9)	1.39 (0.76–2.53)	0.27

* Insomnia (No + Mild = * No; Moderate + Severe = * Yes).

The Table 3 summaries the DASS-10 score of medical education with demographic information. The anxiety, stress and depression were significantly higher, i.e., (Anxiety = 2.4 times; Stress = ~3 time; and Depression = ~3 times) in the female medical students as compared to male students (Table 3). Students living on campus or in hostels have higher levels of Anxiety (OR = 1.2; $p = 0.44$), Stress (OR = 1.3; $p = 0.26$), and Depression (OR = 1.68; $p = 0.14$) than those living at home or elsewhere. Furthermore, those students who have chronic illnesses have a higher DASS score, i.e., 2 times more anxiety, 2.2 times more stress, and 4.2 times more depression compared to those who do not. The DASS score was significantly higher for those students who believed they were not happier than their classmates (Anxiety—OR = 2.8; $p = 0.0001$; Stress—OR = 7.4; $p = 0.0001$; Depression—OR = 51.4; $p = 0.005$). As a result, students who have not solved the problem with themselves are more likely to be anxious (OR = 1.9; $p = 0.005$), stressed (OR = 2.2; $p = 0.003$), and depressed (OR = 1.94; $p = 0.09$) (Table 3).

Table 3. Association between DASS score and different variables.

		Anxiety			Stress			Depression		
Participants	**Total n (%)**	*** Yes n (%)**	**OR (95% CI)**	***p*-Value**	*** Yes n (%)**	**OR (95% CI)**	***p*-Value**	*** Yes n (%)**	**OR (95% CI)**	***p*-Value**
Gender										
Male	146 (40.4)	33 (22.6)	I		21 (14.3)	I		8 (5.5)	I	
Female	215 (59.6)	116 (53.9)	2.4 (1.5–3.7)	0.001	86 (40)	2.8 (1.6–4.6)	0.0001	34 (15.8)	2.8 (1.2–6.4)	0.009
Ages										
17–20	241 (66.8)	113 (46.8)	1.5 (1.0–2.4)	0.04	83 (34.4)	1.7 (1–2.8)	0.03	28 (11.6)	I	
21–23	120 (33.2)	36 (30.0)	I		24 (20)	I		14 (11.7)	1.0 (0.50–1.9)	0.99
Academic year										
1st year	115 (31.9)	57 (49.8)	1.3 (0.8–1.9)	0.16	46 (40)	1.61 (1–2.5)	0.03	14 (12.1)	1.0 (0.54–2.1)	0.84
2nd year	246 (68.1)	92 (37.4)	I		61 (24.8)	I		28 (11.3)	I	
Living situation										
In campus	76 (21.1)	36 (47.3)	1.2 (0.7–1.8)	0.44	28 (36.8)	1.3 (0.8–2.19)	0.26	13 (17.1)	1.68 (0.83–3.3)	0.14
Off campus	285 (78.9)	113 (39.6)	I		79 (27.7)	I		29 (10.1)	I	
Chronic illness										
No	350 (97.0)	140 (40)	I		100 (28.6)	I		37 (10.5)	I	
Yes	11 (3.0)	9 (81.8)	2.04 (0.8–5)	0.12	7 (63.6)	2.2 (0.8–5.8)	0.10	5 (45.4)	4.2 (1.4–13.0)	0.01
Do you see happier than your classmates										
No	225 (62.3)	123 (54.6)	2.8 (1.7–4.5)	0.0001	99 (44.0)	7.4 (3.5–15.8)	0.0001	42 (18.6)	51.4 (3.1–842)	0.005
Yes	136 (37.7)	26 (19.1)	I		8 (5.8)	I		0 (0.0)	I	
Do you manage to solve difficult problems										
No	50 (13.9)	36 (72.0)	1.9 (1.2–3.2)	0.005	28 (56)	2.2 (1.3–3.7)	0.003	10 (20)	1.94 (0.89–4.19)	0.09
Yes	311 (86)	113 (36.3)	I		79 (25.4)	I		32 (10.3)	I	
Diagnosed with a psychological illness										
No	330 (91.4)	130 (39.4)	I		88 (26.6)	I		34 (10.3)	I	
Prefer not to say	12 (3.3)	6 (50)	1.3 (0.5–3.4)	0.64	8 (66.6)	2.5 (0.99–6.3)	0.05	2 (16.67)	1.6 (0.34–7.5)	0.53
Yes	19 (5.3)	13 (68.4)	1.7 (0.8–3.6)	0.14	11 (57.8)	2.17 (0.9–4.7)	0.05	6 (31.5)	3.0 (1.1–8.1)	0.02
Taken any non-prescribed drugs recently cope with stress										
No	319 (87.8)	123 (38.5)	I		89 (27.9)	I		37 (11.6)	I	
Yes	42 (11.6)	24 (57.1)	1.5 (0.8–2.5)	0.15	18 (42.8)	1.5 (0.84–2.7)	0.16	5 (11.9)	1.0 (0.3–2.7)	0.95

* Yes—We take the responses of those students who have anxiety, stress, and depression. We excluded those students who say they have no anxiety, stress, and depression in this table.

According to Table 4, academic factors of preclinical students were associated with their sleeping and DASS scores. A majority of students found the current course challenging, 37.1% moderately challenging, and 47.1% very challenging, but no significant sleeping problems were found ($\chi^2 = 3.4$; $p = 0.48$). Additionally, these students believed the course

was challenging and among them, 50.9% reported no anxiety while 41.6% mentioned anxiety issues. In addition, 10.2% of students believed the current course was extremely challenging, while 12.1% reported moderate to severe anxiety. Similarly, students believed the current course was extremely challenging, total of 8.7% of students report no stress, but 14% report moderate to severe stress (χ^2 = 10.5; p = 0.03), and 19% students under depression. Furthermore, in the current study, students who had poor academic performance (15.8%), satisfactory academic performance (21.3%), or good academic performance (30.7%) had significant sleeping problems found (χ^2 = 19.4; p = 0.001), among them poor academic performance students 21.6%, satisfactory academic performance students (29.3%), and good academic performance students (29.3%) had moderate to severe levelled sleeping problems. Similarly, poor, satisfactory, and good academic performers experienced the highest levels of anxiety (poor = 21.5%; satisfactory = 22.1%; and good = 22.8%); stress (poor = 22.4%; satisfactory = 25.2%; and good = 22.4%); and depression (poor = 40.5%; satisfactory = 40.5%; and good = 11.9%).

In the current study, 231 (64.0%) of the students had good time management skills. Among those students with poor time management skills, they had sleeping issues that were significantly higher (χ^2 = 15.5; p = 0.000). In the current study, students who lack time management skills reported high levels of anxiety (69.1%), stress (73.8%), and depression (83.3%).

Table 5 provides a relationship between sleep and DASS scores and students' lifestyle factors. Students who smoke occasionally (6.03%) have more sleeping problems (χ^2 = 16.6; p = 0.005) than those who never smoke (92.9%). Additionally, those students with low fitness levels had significantly higher (χ^2 = 15.09; p = 0.01) sleeping issues (average fitness issues = 35.3%; poor fitness issues = 39.6%; unfit fitness issues = 8.6%). A low fitness student's lifestyle is closely related to their DASS score, whereas poor fitness students have more anxiety (44.3%), stress (43.9%) and depression (61.9%). There are only 6.4% of students who are medically unable to participate in the sport. The students with medical limitations did not have a lot of sleeping problems or psychological problems. In addition to having some sleep issues, anxiety and stress, these students (14.4%) consider themselves obese. Those students have overall habits of eating healthy foods were poor, and fair they have significantly high (χ^2 = 32.1; p = 0.000) sleeping issue problem (Poor = 37.9%; Fair = 42.2%). Moreover, DASS score also affected in the current study with those students eats with poor and fair eating healthy foods, [Anxiety = poor 30.9%, fair 37.6%; Stress = poor 36.4%, fair 32.7; Depression = poor 45.2%, fair 35.7%].

The majority of students (93.9%) live with their families. Students who live with their families have a higher anxiety score (96.6%) than students who do not. Furthermore, 21.1% of students live with their relatives. Of those students, only 25.0% have sleeping problems, 21.5% have anxiety, 23.4% have stress, and 21.4% have depression problems. Those students reported they were not social people. They had more sleeping issues (54.3%) and DASS was also high (anxiety = 60.4%; stress = 64.5%; and depression = 69.0%) as compared to those students who have social activities. Furthermore, the students who believed that Coronaviruses affected their social life had more sleeping problems (41.4%) and they were significantly higher than the average (χ^2 = 13.9; p = 0.003), and psychological variables were also significantly high (Anxiety = 10.3 (0.006); Stress = 16.3 (0.000); depression = 5.26 (0.07) of who believed their social life was badly affected due to COVID. Only 5.8% pre-clinical medical students have reported coronavirus affected his/her financial situation, among them not found any major sleeping and psychological issues. Students with family members diagnosed with Coronaviruses have a significantly higher percentage of sleeping issues (χ^2 = 4.92; p = 0.01) (Table 6).

Table 4. DASS10 and insomnia are associated with the academic factor of participants.

			Insomnia Severity *			Anxiety #			Stress #			Depression #		
Item	**Categories**	**N (%)**	**No 245 (%)**	**Yes 116 (%)**	***p*-Value**	**No 212 (%)**	**Yes 149 (%)**	***p*-Value**	**No 254 (%)**	**Yes 107 (%)**	***p*-Value**	**NO 319 (%)**	**Yes 42 (%)**	***p*-Value**
How challenging do you find your course?	Not challenging at all	14 (3.9)	9 (3.7)	5 (4.3)	3.4 (0.48)	6 (2.8)	8 (5.4)	5.5 (0.23)	11 (4.3)	3(2.8)	10.5 (0.03)	14 (4.4)	0 (0)	7.4 (0.11)
	Less challenging	6 (1.7)	6 (2.4)	0 (0)		2 (0.9)	4 (2.7)		2 (0.8)	4 (3.7)		6 (1.9)	0 (0)	
	Moderately Challenging	134 (37.1)	91 (37.1)	43 (37.0)		77 (36.3)	57 (38.3)		89 (35.0)	45 (42.1)		122 (38.2)	12 (28.6)	
	Very Challenging	170 (47.1)	116 (47.3)	54 (46.6)		108 (50.9)	62 (41.6)		130 (51.2)	40 (37.4)		148 (46.4)	22 (52.4)	
	Extremely challenging	37 (10.2)	23 (9.4)	14 (12.1)		19 (9.0)	18 (12.1)		22 (8.7)	15 (14.0)		29 (9.1)	8 (19.0)	
your educational performance level	Poor	57 (15.8)	32 (13.1)	25 (21.6)	19.4 (0.001)	25 (11.8)	32 (21.5)	11.3 (0.02)	33 (13)	24 (22.4)	9.0 (0.06)	40 (12.5)	17 (40.5)	43.6 (0.00)
	Satisfactory	77 (21.3)	43 (17.6)	34 (29.3)		44 (20.8)	33 (22.1)		50 (19.7)	27 (25.2)		60 (18.8)	17 (40.5)	
	Good	111 (30.7)	77 (31.4)	34 (29.3)		77 (36.3)	34 (22.8)		87 (34.3)	24 (22.4)		106 (33.2)	5 (11.9)	
	Very good	88 (24.4)	74 (30.2)	14 (12.1)		52 (24.5)	36 (24.2)		64 (25.2)	24 (22.4)		88 (27.6)	0 (0)	
	Excellent	28 (7.8)	19 (7.8)	9 (7.8)		14 (6.6)	14 (9.4)		20 (7.9)	8 (7.5)		25 (7.8)	3 (7.1)	
You often miss your classes	Yes	53 (14.7)	35 (14.3)	18 (15.5)	8.3 (0.03)	13 (6.1)	40 (26.8)	35.1 (0.00)	32 (12.6)	21 (19.6)	6.13 (0.10)	50 (15.7)	3 (7.1)	5.47 (0.14)
	No	162 (44.9)	117 (47.8)	45 (38.8)		106 (50)	56 (37.6)		122 (48.0)	40 (37.4)		146 (45.8)	16 (38.1)	
	Occasionally	143 (39.6)	93 (38.0)	53 (45.6)		93 (43.9)	50 (33.6)		100 (39.4)	46 (43)		123 (38.5)	23 (54.8)	
you have good time management skills	Yes	231 (64.0)	105 (42.9)	25 (21.6)	15.5 (0.000)	84 (39.6)	46 (30.9)	2.9 (0.05)	102 (40.2)	28 (26.2)	6.3 (0.007)	123 (38.6)	7 (16.7)	7.71 (0.003)
	No	130 (36.0)	140 (57.1)	91 (78.4)		128 (60.4)	103 (69.1)		152 (59.8)	79 (73.8)		196 (61.4)	35 (83.3)	
Communicating with your professors and tell your struggle in your class.	Yes	37 (10.2)	27 (11.0)	10 (8.6)	7.4 (0.02)	28 (13.2)	9 (6.0)	32.0 (0.000)	30 (11.8)	7 (6.5)	32.3 (0.000)	32 (10)	5 (11.9)	9.4 (0.009)
	No	264 (73.1)	169 (69)	95 (81.9)		132 (62.3)	132 (88.6)		165 (65.0)	99 (92.5)		227 (71.2)	37 (88.1)	
	Occasionally	60 (16.6)	49 (20)	11 (9.5)		52 (24.5)	8 (5.4)		59 (23.2)	1 (0.9)		60 (18.8)	0 (0)	

Table 4. *Cont.*

Item	Categories	N (%)	Insomnia Severity *			Anxiety #			Stress #			Depression #		
			No 245 (%)	Yes 116 (%)	*p*-Value	No 212 (%)	Yes 149 (%)	*p*-Value	No 254 (%)	Yes 107 (%)	*p*-Value	NO 319 (%)	Yes 42 (%)	*p*-Value
Most of Students suffer from the great pressure to pass	Yes	223 (61.8)	144 (58.8)	79 (68.1)	3.01 (0.22)	137 (64.6)	86 (57.7)	4.1 (0.12)	158 (62.2)	65 (60.7)	1.28 (0.52)	200 (62.7)	23 (54.8)	2.73 (0.25)
	No	20 (5.5)	14 (5.7)	6 (5.2)		14 (6.6)	6 (4)		16 (6.3)	4 (3.7)		19 (6)	1 (2.4)	
	I don't know	118 (32.7)	87 (35.5)	31 (26.7)		61 (28.8)	57 (38.3)		80 (31.5)	38 (35.5)		100 (31.3)	18 (42.9)	
there is competition among the students to achieved high grade	Yes	165 (45.7)	95 (38.8)	70 (60.3)	24.6 (0.000)	85 (40.1)	80 (53.7)	7.2 (0.02)	108 (42.5)	57 (53.3)	19.6 (0.000)	142 (44.5)	23 (54.8)	6.3 (0.04)
	No	41 (11.4)	23 (9.4)	18 (15.5)		29 (13.7)	12 (8.1)		41 (16.1)	0 (0)		41 (12.9)	0 (0)	
	To a certain extent	155 (42.9)	127 (51.8)	28 (24.1)		98 (46.2)	57 (38.3)		105 (41.3)	50 (46.7)		136 (42.6)	19 (45.2)	

* Insomnia (No + Mild = No; Moderate + Severe = Yes). # DASS10 = Anxiety, Stress, and Depression (No + Mild = No; Moderate + Severe = Yes).

Table 5. DASS10 and insomnia are associated with the **lifestyle factor** of participants.

Item	Categories	n (%)	Insomnia Severity *			Anxiety #			Stress #			Depression #		
			No 245 (%)	Yes 116 (%)	*p*-Value	No 212 (%)	Yes 149 (%)	*p*-Value	No 254 (%)	Yes 107 (%)	*p*-Value	NO 319 (%)	Yes 42 (%)	*p*-Value
Do You Smoke tobacco	Yes	16 (4.4)	12 (4.9)	4 (3.4)	16.6 (0.005)	9 (4.2)	7 (4.7)	9.95 (0.07)	9 (3.5)	7 (6.5)	11.67 (0.04)	13 (4.1)	3 (7.1)	2.1 (0.83)
	No	335 (92.8)	230 (93.9)	105 (90.5)		197 (92.9)	138 (92.6)		238 (93.7)	97 (90.7)		296 (92.8)	39 (92.9)	
	Occasionally	10 (2.7)	3 (1.2)	7 (6.03)		6 (2.83)	4 (2.68)		7 (2.7)	3 (2.8)		10 (3.1)	0 (0)	
Current fitness level	Perfect	13 (3.6)	13 (5.3)	0 (0)	15.09 (0.01)	13 (6.1)	0 (0)	25.3 (0.000)	13 (5.1)	0 (0)	19.4 (0.002)	13 (4.1)	0 (0)	22.0 (0.001)
	Good	87 (24.1)	65 (26.5)	22 (19.0)		51 (24.1)	36 (24.2)		68 (26.8)	19 (17.8)		84 (26.3)	3 (7.1)	
	Average	122 (33.8)	81 (33.1)	41 (35.3)		82 (38.7)	40 (26.8)		90 (35.4)	32 (29.9)		112 (35.1)	10 (23.8)	
	Poor	121 (33.5)	75 (30.6)	46 (39.6)		52 (24.5)	66 (44.3)		71 (28.0)	47 (43.9)		92 (28.8)	26 (61.9)	
	Unfit	18 (5.0)	8 (3.3)	10 (8.6)		11 (5.2)	7 (4.7)		9 (3.5)	9 (8.4)		15 (4.7)	3 (7.1)	

Table 5. *Cont.*

			Insomnia Severity *			Anxiety #			Stress #			Depression #		
Item	**Categories**	**n (%)**	**No 245 (%)**	**Yes 116 (%)**	***p*-Value**	**No 212 (%)**	**Yes 149 (%)**	***p*-Value**	**No 254 (%)**	**Yes 107 (%)**	***p*-Value**	**NO 319 (%)**	**Yes 42 (%)**	***p*-Value**
Regular physical activity	Yes	117 (67.6)	80 (32.7)	37 (31.9)	0.02 (0.49)	75 (35.4)	42 (28.2)	2.06 (0.09)	91 (35.8)	26 (24.3)	4.56 (0.02)	111 (34.8)	6 (14.3)	7.12 (0.004)
	No	244 (67.6)	165 (67.3)	79 (68.1)		137 (64.6)	107 (71.8)		163 (64.2)	81 (75.7)		208 (65.2)	36 (85.7)	
Medical limitations to preventing from sport	Yes	23 (6.4)	15 (6.1)	8 (6.9)	1.49 (0.47)	11 (5.2)	12 (8.1)	5.62 (0.06)	15 (5.9)	8 (7.5)	7.56 (0.02)	23 (7.2)	0 (0)	25.8 (0.000)
	No	338 (93.6)	230 (93.8)	108 (93.1)		201 (94.8)	137 (91.9)		239 (94.1)	99 (92.5)		296 (92.8)	42 (100)	
Do consider yourself obese	Yes	52 (14.4)	32 (13.1)	20 (17.2)	6.54 (0.03)	28 (13.2)	24 (16.1)	5.31 (0.07)	35 (13.8)	17 (15.9)	3.20 (0.20)	49 (15.4)	3 (7.1)	2.07 (0.35)
	No	257 (71.2)	170 (69.4)	87 (75.0)		146 (68.9)	111 (74.5)		177 (69.7)	80 (74.8)		225 (70.5)	32 (76.2)	
	Maybe	52 (14.4)	43 (17.6)	9 (7.8)		38 (17.9)	14 (9.4)		42 (16.5)	10 (9.3)		45 (14.1)	7 (16.7)	
Overall habits of eating healthy foods	Excellent	14 (3.9)	14 (5.7)	0 (0)	32.1 (0.000)	8 (3.8)	6 (4)	10.9 (0.027)	11 (4.3)	3 (2.8)	7.09 (0.13)	14 (4.4)	0 (0)	10.6 (0.03)
	Very good	35 (9.7)	31 (12.7)	4 (3.4)		27 (12.7)	8 (5.4)		29 (11.4)	6 (5.6)		32 (10)	3 (7.1)	
	Good	96 (26.6)	77 (31.4)	19 (16.4)		63 (29.7)	33 (22.1)		72 (28.3)	24 (22.4)		91 (28.5)	5 (11.9)	
	Fair	111 (30.7)	62 (25.3)	49 (42.2)		55 (25.9)	56 (37.6)		76 (29.9)	35 (32.7)		96 (30.1)	15 (35.7)	
	Poor	105 (29.1)	61 (24.9)	44 (37.9)		59 (27.8)	46 (30.9)		66 (26.0)	39 (36.4)		86 (27.0)	19 (45.2)	

* Insomnia (No + Mild = No; Moderate + Severe = Yes). # DASS10 = Anxiety, Stress, and Depression (No + Mild = No; Moderate + Severe = Yes).

Table 6. DASS10 and insomnia are associated with the **Social and COVID-19 factor** of participants.

			Insomnia Severity *			Anxiety #			Stress #			Depression #		
Item	**Categories**	**n (%)**	**No 245 (%)**	**Yes 116 (%)**	***p*-Value**	**No 212 (%)**	**Yes 149 (%)**	***p*-Value**	**No 254 (%)**	**Yes 107 (%)**	***p*-Value**	**No 319 (%)**	**Yes 42 (%)**	***p*-Value**
Social Factors														
Do you live with your family?	Yes	339 (93.9)	230 (93.9)	109 (94.0)	0.01 (0.59)	195 (92.0)	144 (96.6)	3.32 (0.05)	236 (92.9)	103 (96.3)	1.47 (0.16)	300 (94.0)	39 (92.9)	0.91 (0.48)
	No	22 (6.1)	15 (6.1)	7 (6.0)		17 (8.0)	5 (3.4)		18 (7.1)	4 (3.7)		19 (6)	3 (7.1)	
Do you live with your relative?	Yes	76 (21.1)	47 (19.2)	29 (25.0)	1.6 (0.13)	44 (20.8)	32 (21.5)	0.02 (0.48)	51 (20.1)	25 (23.4)	0.48 (0.28)	67 (21.0)	9 (21.4)	0.004 (0.5)
	No	285 (78.9)	198 (80.8)	87 (75)		168 (79.2)	117 (78.5)		203 (79.9)	82 (76.6)		252 (79.0)	33 (78.6)	
Describe yourself as a social person	Yes	184 (51.0)	131 (53.5)	53 (45.7)	1.9 (0.10)	125 (59.0)	59 (39.6)	13.1 (0.000)	146 (57.5)	38 (35.5)	14.5 (0.000)	171 (53.6)	13 (31.0)	7.6 (0.004)
	No	177 (49.0)	114 (46.5)	63 (54.3)		87 (41.0)	90 (60.4)		108 (42.5)	69 (64.5)		148 (46.4)	29 (69.0)	
Set time to socialize with other mates	Yes	173 (47.9)	130 (53.1)	43 (37.1)	8.0 (0.003)	114 (53.8)	59 (39.6)	7.04 (0.005)	133 (52.4)	40 (37.4)	6.7 (0.006)	164 (51.4)	9 (21.4)	13.3 (0.000)
	No	188 (52.1)	115 (46.9)	73 (62.9)		98 (46.2)	90 (60.4)		121 (47.6)	67 (62.6)		155 (48.6)	33 (78.6)	
Coronavirus factors														
COVID-19 affected your social life	Huge extend	101 (28.0)	53 (21.6)	48 (41.4)	15.6 (0.000)	46 (21.7)	55 (36.9)	10.3 (0.006)	60 (23.6)	41 (38.3)	16.3 (0.000)	86 (27.0)	15 (35.7)	5.26 (0.07)
	Medium extend	116 (32.1)	88 (35.9)	28 (24.1)		72 (34.0)	44 (29.5)		76 (29.9)	40 (37.4)		109 (34.2)	7 (16.7)	
	Small extend	144 (39.9)	104 (42.4)	40 (34.5)		94 (44.3)	50 (33.6)		118 (46.5)	26 (24.3)		124 (38.9)	20 (47.6)	
COVID-19 affected your financial situation	Huge extend	21 (5.8)	8 (3.3)	13 (11.2)	13.9 (0.003)	8 (3.8)	13 (8.7)	4.31 (0.22)	13 (5.1)	8 (7.5)	9.6 (0.02)	20 (6.3)	1 (2.4)	1.49 (0.68)
	Medium extend	78 (21.8)	47 (19.2)	31 (26.7)		45 (21.2)	33 (22.1)		45 (17.7)	33 (30.8)		70 (21.9)	8 (19.0)	
	Small extend	80 (22.2)	55 (22.4)	25 (21.6)		47 (22.2)	33 (22.1)		62 (24.4)	18 (16.8)		69 (21.6)	11 (26.2)	
	Not at all	182 (50.4)	135 (55.1)	47 (40.5)		112 (52.8)	70 (47.0)		134 (52.8)	48 (44.9)		160 (50.2)	22 (52.4)	
Your family been diagnosed with COVID-19	Yes	203 (56.2)	128 (52.2)	75 (64.7)	4.92 (0.01)	111 (52.4)	92 (61.7)	3.1 (0.04)	147 (57.9)	56 (52.3)	0.93 (0.19)	185 (58)	18 (42.9)	3.45 (0.04)
	No	158 (43.8)	117 (47.8)	41 (35.3)		101 (47.6)	57 (38.3)		107 (42.1)	51 (47.7)		134 (42)	24 (57.1)	

Table 6. *Cont.*

			Insomnia Severity *			Anxiety #			Stress #			Depression #		
Item	**Categories**	**n (%)**	**No 245 (%)**	**Yes 116 (%)**	***p*-Value**	**No 212 (%)**	**Yes 149 (%)**	***p*-Value**	**No 254 (%)**	**Yes 107 (%)**	***p*-Value**	**No 319 (%)**	**Yes 42 (%)**	***p*-Value**
Social Factors														
Faced problem of getting along with university	Yes	127 (35.2)	80 (32.7)	47 (40.5)	2.13 (0.09)	56 (26.4)	71 (47.7)	17.3 (0.000)	65 (25.6)	62 (57.9)	34.5 (0.000)	105 (32.9)	22 (52.4)	6.1 (0.01)
	No	234 (64.8)	165 (67.3)	69 (59.5)		156 (73.6)	78 (52.3)		189 (74.4)	45 (42.1)		214 (67.1)	20 (47.6)	
During pandemic crisis you noticed an increase in the anxiety level	Yes	234 (64.8)	145 (59.2)	89 (76.7)	10.6 (0.001)	111 (52.4)	123 (82.6)	34.9 (0.000)	141 (55.5)	93 (86.9)	32.5 (0.000)	200 (62.7)	34 (81)	5.42 (0.01)
	No	127 (64.8)	100 (40.8)	27 (23.3)		101 (47.6)	26 (17.4)		113 (44.5)	14 (13.1)		119 (37.3)	8 (19)	

* Insomnia (No + Mild = No; Moderate + Severe = Yes). # DASS10 = Anxiety, Stress, and Depression (No + Mild = No; Moderate + Severe = Yes).

6. Discussion

Prior to entering the clinical wards and interacting with patients, pre-clinical students undergo an intensive course. In this regard, monitoring the well-being of these students is important before they move on to the next stage. Studies on sleep habits and psychological problems among this group are limited, however, they have shown significant associations with lifestyles, academics, social, and Coronavirus effects. Our study aimed to evaluate sleep quality in different subgroups of preclinical medical students, and then to identify specific lifestyle factors, academic and social factors as well as Corona virus related factors that were associated with poor sleeping quality and poor psychological health.

In our study, we found that a good number of participants (moderate and severe levels) had poor sleep quality. About 31.1% of our sample had this problem. As found in local and international studies, the insomnia rate was found to be as high as 38.4% among medical workers in Wuhan, which is close to the 34% found in another study [4,28]. The prevalence of poor sleep quality was same or higher than in previous literature, with a range between 30% and 59% [29,30]. Preclinical medical students in this study experienced significant increases in depression, anxiety, and stress symptoms after starting medical school. The prevalence of current state of stress (29.6%) and anxiety (41.3%) is inherently accompanied by an unhealthy level of depression (44.6%) with moderate to severe level. Many studies found more or less similar results, according to the Malaysian study (37.2% depression, 63.0% anxiety, and 23.7% stress) [31]. A study conducted in Saudi Arabia found that moderate to extremely severe levels of depression, anxiety, and stress were present in 52.4%, 46%, and 56% of Saudi Arabian medical students [32].

An interesting finding in our study results was that female students were equally likely to experience stress and sleep disturbances. The same has been found in some international studies [6,7]. There is no clear explanation for gender differences in sleep quality. Sleep disturbances may be associated with psychological problems such as anxiety and depression, which are more prevalent among females than males [33]. Students between the ages of 21 and 23 have poorer sleep quality than those between the ages of 17 and 20. Perhaps the second-year students have more lectures, and study loads, and are thinking about the end of their clinical year they have more anxiety and stress also. The results of this study are in agreement with those of Brick et al. [34] From California University, USA. As reported in a recent study from Egypt [13], students enrolled in the preclinical years had higher PSQI scores than those enrolled in the clinical years. The present study found that students who lived in university dormitories had poorer sleep, anxiety, stress, and depression quality than those who lived with their families. The results of this study are in agreement with those of the Egyptian study [13]. Furthermore, in the current study agreed with the one of the international study, if any students have any chronic illness they have more prevalence of sleeping, anxiety, stress and depression problems [35]. Moreover, our study also agreed with two international studies. Compared with their classmates, these students believe that they are not happier and that they have more problems with sleep, stress, and depression [36,37].

Among medical students, academic stress was associated with an increased risk of physical and mental health problems [38]. Medical students are stressed, anxiety, depression out by many academic factors, including examinations, poor time management, insufficient time for revision, and being unable to handle the huge amount of syllabus work [39]. Additionally, finding reported in the current study, stress, anxiety, and depression in many academic factors, including that current courses are more challenging, poor education performances, and lack of communication with teachers about struggles in academic fields. Furthermore, Cognitive processes are stabilized and enhanced by sleep. For higher education, more specifically for medical education, cognitive competencies such as memory consolidation and encoding are crucial because medical students are required to retain a large amount of complex factual knowledge within a short period of time [40]. Academic performance was correlated with insomnia symptoms, including difficulty falling asleep within 30 min of going to bed and waking up frequently at night [29,41]. According to our

findings, students with poor, or satisfactory education results have more sleeping problems than high achievers. Low sleep quality, as well as high anxiety and stress, negatively affect exam preparation and performance, resulting in depression. The results of this study indicate a positive correlation between lifestyle factors and anxiety, stress depression, psychopathological symptoms, and sleep quality. The current study also found that unfit, or poor fitness students have more sleep, anxiety, stress, and depression problems. Physical activity may benefit a person's health in a variety of ways [42]. Students may also benefit from living with their families and fellow students because they can push themselves to a greater extent at the expense of their mental health. However, some students prefer to live in a hostel rather than with their families. They desire a competitive environment for studying. In order to prevent medical students' psychological symptoms from becoming worse as the years of study accumulate, health-promoting coping strategies, such as participating in social and sports activities at university, should be encouraged [18].

COVID-19 has resulted in numerous interruptions to medical training, however, during our study, we reported that students thought Coronaviruses affected their social lives significantly. They experienced more sleeping problems, more anxiety stress, and more depression. One international study also found that medical students affected by COVID-19 have more sleeping problems and other psychological problems [43]. According to the current study, those who had a family member infected by Coronavirus became anxious and had high levels of stress, anxiety, and depression. However, those who did not have a family member infected showed lower levels of sleeping, anxiety, and depression problems. Similar findings have also been reported in China and Albania [44,45]. In our state, anxiety levels can be exacerbated by long-lasting and unpredictable traumatic events, such as pandemics, which are long-term and unpredictable events that can cause anxiety. The correlation is significant, as the pre-clinical medical students (and any of their family members) were more hopeless when they were infected with Coronavirus [18,46].

7. Conclusions

As far as we are aware, this is the first study that provides significant insight into pre-clinical medical students' anxiety, stress, and depression levels. Those with disadvantaged social backgrounds and unhealthy lifestyles are at increased risk of psychological distress, which also affects their academic performance. As such, the creation of healthy lifestyle interventions may be useful to minimize the burden of psychological distress on an absolute level among medical students. Sleep problems and psychological distress were found to be prevalent problems, which negatively affected pre-clinical students' academic goals, lifestyles, and social lives. Poor sleep quality was correlated with anxiety and enrollment in basic academic years. Medical students need to be screened for sleep quality, anxiety, stress, and depression as part of public health policies. Such conditions can be detected and managed earlier if this is carried out. The study provides a better picture of the factors associated with sleeping and psychological distress and points to the need for further investigation of these problems. Researchers were able to draw the attention of university administrators, healthcare promoters, and health counsellors to sleep problems and psychological issues among pre-medical students by using the findings of the study. This study encourages medical schools to increase awareness about the negative impacts of sleep disorders on academic performance, lifestyles, and social factors.

8. Limitation

Some key limits were encountered. The study subjects were comprised of chiefly undergraduate medical students (pre-clinical) from a single university. If possible, further studies are needed to determine whether the current findings are broadly generalizable to other students, including other universities in the region and abroad.

Author Contributions: Conceptualization, S.J.K.; Data curation, A.M.A., S.I.M., S.J.K., A.A., M.M.A. and S.K.; Formal analysis, A.A., M.M.A. and T.A.; Funding acquisition, F.A.A. and A.M.A.; Investigation, S.A., T.A. and S.K.; Methodology, F.A.A., A.M.A., S.J.K. and T.A.; Project administration, F.A.A.; Resources, H.A., A.A. and M.M.A.; Software, S.A.; Supervision, A.M.A.; Validation, K.S.; Visualization, K.S.; Writing—original draft, F.A.A. and T.A.; Writing—review & editing, S.A.A.-S., K.S. and G.D. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of College of Medicine, King Saud University. (Ref. No. 22/0455/IRB) (protocol code 7805 and date of approval: 1 January 2022).

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

Acknowledgments: The authors want to extend their appreciation to the Deanship of Scientific Research, Research Center, College of Medicine and Cardiac Sciences Department at King Khalid University Hospital—Medical City King Saud University for their constructive scientific and technical support during this research. As stated in the acknowledgements, none of the authors has a conflict of interest.

Conflicts of Interest: The authors declare no conflict of interest.

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