

Association of academic stress with sleeping difficulties in medical students of a Pakistani medical school: a cross sectional survey

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Introduction: Medicine is one of the most stressful fields of education because of its highly demanding professional and academic requirements. Psychological stress, anxiety, depression and sleep disturbances are highly prevalent in medical students. **Methods:** This cross-sectional study was undertaken at Combined Military Hospital Lahore Medical College and Institute of Dentistry in Lahore (CMH LMC), Pakistan. Students enrolled in all yearly courses for the Bachelor of Medicine and Bachelor of Surgery (MBBS) degree were included. The questionnaire consisted of four sections: 1) demographics 2) a table listing 34 potential stressors, 3) the 14-item Perceived Stress Scale (PSS-14), and 4) the Pittsburgh Quality of Sleep Index (PSQI). Logistic regression was run to identify associations between group of stressors, gender, year of study, student's background, stress and quality of sleep. **Results:** Total response rate was 93.9% (263/280 respondents returned the questionnaire). The mean (SD) PSS-14 score was 30 (6.97). Logistic regression analysis showed that cases of high-level stress were associated with year of study and academic-related stressors only. Univariate analysis identified 157 cases with high stress levels (59.7%). The mean (SD) PSQI score was 8.1 (3.12). According to PSQI score, 203/263 respondents (77%) were poor sleepers. Logistic regression showed that mean PSS-14 score was a significant predictor of PSQI score (OR 1.99, $P < 0.05$). **Conclusion:** We found a very high prevalence of academic stress and poor sleep quality among medical students. Many medical students reported using sedatives more than once a week. Academic stressors contributed significantly to stress and sleep disorders in medical students.

21 **Introduction**

22 Medicine is one of the most stressful fields of education because of its highly demanding professional
23 and academic requirements. Extensive medical curricula, frequent examinations and fear of failure are
24 sources of constant stress and anxiety for medical students (1), who may cut short their leisure
25 activities and hours of sleep in order to achieve their desired goals. Several studies have reported a high
26 incidence of stress disorders among medical students. According to a systematic review published in
27 2006, US and Canadian medical students suffer from a higher incidence of psychological distress,
28 anxiety, depression and suicidal ideation than the general population (2). Sherina et al. reported that
29 41% of Malaysian medical students suffered from psychological stress, which correlated directly with
30 depressive symptoms (3). Several studies have reported the prevalence of psychological stress in
31 medical students of different nationalities. Prevalence of stress was reported to be 20.9% in a Nepali
32 medical school (4), 63.8% in a Saudi Arabian (5) and 90% in a Pakistani medical school (6).
33 Psychological stress among medical students may have deleterious consequences and it further leads to
34 poor academic performance (7), sleep disorders (8), alcohol and substance abuse (9), decreased
35 empathy, poor attitude towards the chronically ill and cynicism (10).

36 Several studies have also reported poor sleep quality in medical students. Anjum et al. found
37 that the prevalence of disturbed sleep patterns among Pakistani medical students was higher than in
38 their non-medical counterparts (11). Psychological stress is a triggering factor for insomnia and has a
39 bidirectional association with poor sleep quality (12). Thus, it represents a vicious cycle that is
40 associated with adverse mental health consequences in medical students. Poor sleep quality is also
41 associated with dysregulation of the human metabolome (13), high failure rates and poor academic
42 performance (14).

43 Most of the medical schools in Punjab, Pakistan offer a 5-year-long Bachelor of Medicine and
44 Bachelor of Surgery (MBBS) degree program divided into 2 preclinical years followed by 3 clinical

45 years. These schools use conventional non-problem-based learning (PBL) teaching methods, which
46 consist of teacher-centered didactic techniques, long lectures, tutorials and practical tasks. Students are
47 frequently assessed with written, oral or practical examinations throughout the year, and each year ends
48 with a final exam held by the University of Health Sciences in Lahore. A passing grade on this exam is
49 necessary to qualify for the next academic year. According to Shah et al., Pakistani medical students
50 who reported academic stressors as often/always were 3.45 times more likely to be suffering from
51 psychological stress than their counterparts reporting a never/sometimes response for it (1).

52 Several studies have reported the prevalence of stress among medical students in Pakistani.
53 However, the paucity of knowledge on pattern of sleeping difficulties in Pakistani medical students and
54 its association with academic stress warranted this study. This study was designed with two aims: 1) to
55 determine the prevalence of psychological stress and pattern of sleeping difficulties among medical
56 students, and 2) to explore the relationship between academic stressors, psychological stress and poor
57 sleeping habits among medical students.

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60 **Methodology**

61 **Study design**

62 This cross-sectional study was done at Combined Military Hospital Lahore Medical College (CMH
63 LMC) and Institute of Dentistry, Lahore (Pakistan) after approval by the CMH LMC Research Ethics
64 Committee. Students from all yearly courses of the MBBS degree program were included in this study,
65 which took place from August, 2014 to September, 2014. The sample size required for this survey was
66 calculated as 251 participants for a 95% confidence level, a 5% margin of error and a population size
67 of 720 medical students. Students were randomly selected with a stratified sampling technique. First
68 the students were divided into groups based on their year of study. Then random numbers were

69 generated using computer software. A total of 280 self-administered questionnaires were distributed to
70 potential respondents to ensure an adequate percentage response rate. Written informed consent was
71 obtained from all participants. They were informed about the aims of this study and assured anonymity
72 and that only group-level findings would be reported.

73

74 **Questionnaire**

75 The questionnaire consisted of four sections: 1) demographics 2) a table listing 34 potential stressors,
76 3) the 14-item Perceived Stress Scale (PSS-14), and 4) the Pittsburgh Quality of Sleep Index (PSQI).
77 The demographics section recorded data for participants' age, gender, year of study, residence and
78 background. The table of potential stressors was taken from a similar study in a Pakistani medical
79 school by Shah et al. (1) and used to obtain data on the frequency and severity of each potential
80 stressor. Frequency was reported as never, rarely, sometimes, often or always, and severity was rated
81 with a Likert-type response scale of increasing severity from 1 to 10.

82 The PSS-14, developed by Sheldon Cohen (15), is one of the most widely used psychological
83 instruments to measure perceived stress. It comprises 7 positively-stated and 7 negatively-stated items,
84 and is scored by reverse coding the negatively-stated items and then summing the scores for all 14
85 items. The scores range from 0 to 56 with higher scores indicating higher levels of stress.

86 The fourth section of the questionnaire consisted of the PSQI, a self-rating questionnaire that
87 assesses sleep quality and disturbances during the preceding month. This instrument comprises 19
88 individual items and yields an overall score ranging from 0 to 21. Participants who score higher than 5
89 are considered poor sleepers. It also yields scores on seven other components: subjective sleep quality,
90 sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleeping medication
91 and daytime dysfunction (16).

92

93 **Data analysis**

94 All data were analyzed in SPSS Inc., Chicago, IL, USA v. 20 software. Frequencies were calculated for
95 demographic variables. Mean PSS-14 scores were calculated and divided into quartiles, then further
96 recoded as a dichotomous variable by combining the upper two quartiles and lower two quartiles (cut-
97 off value = 28). These values were recoded as 1 = high stress levels and 0 = low stress levels, as in an
98 earlier study from Pakistan (1). The frequencies of stressors were grouped into dichotomies as follows:
99 Never/rarely/sometimes = 0 and often/always = 1. These stressors were also grouped into three
100 domains: psychosocial stressors, academic stressors and health-related stressors. Mean severity of
101 stressors was calculated. Logistic regression was used to identify the determinants of perceived stress.
102 The PSS-14 score was used as a dependent variable and age, year of study, gender, residence,
103 background, psychosocial stressors, health-related stressors and academic stressors were used as
104 independent variables. Response frequencies and percentage were reported for subscales of PSQI.
105 Binary logistic regression was used to identify associations between PSS-14 scores and PSQI global
106 scores (dichotomous variable). Independent sample T test was run to analyze association between
107 academic stressors (less than often/often and always) and PSQI scores.

108

109 **Results**

110 **Demographic characteristics**

111 Total response rate was 93.9% (263 of 280 respondents returned the questionnaire). Mean age (SD) of
112 respondents was 21.1 years (1.78). The gender distribution of the respondents was 148 women (56.3
113 %) vs. 115 men (43.7%). Most participants were of Pakistani background (220, 83.7%) and the
114 remaining 43 respondents (16.3%) were of other nationalities. Most of the participants resided off the
115 medical school campus (161, 61.2%) and the remaining 102 (38.2%) resided in student residence

116 facilities. The distribution according to year of study was 1st year 58 (22%), 2nd year 67 (25.5%), 3rd
117 year 48 (18.3%), 4th year 45 (17.1%) and 5th year 45 participants (17.1%).

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119 **Perceived stress**

120 Mean (SD) PSS-14 score was 30 (6.97). According to logistic regression analysis, cases of high-level
121 stress were associated with year of study and academic stressors only (Table 1). Univariate analysis
122 identified a total of 157 cases with high stress levels (59.7%). Most respondents with high levels of
123 stress were 2nd-year students (48, 71.6%) and 5th-year students (32, 71.1%), followed by 1st-year (29,
124 50%), 3rd-year (24, 50%) and 4th-year students (24, 53.3%).

125

126 **Stressors**

127 The frequency and severity are shown for academic stressors in Table 2, psychosocial stressors in
128 Table 3, and health-related stressors in Table 4. The frequency of different stressors was reported as
129 often/always by 147 (55.9 %) respondents for academic stressors, 45 (17.1%) for psychosocial
130 stressors, and 48 (18.3%) for health-related stressors.

131

132 **Quality of sleep**

133 Mean (SD) PSQI score was 8.1 (3.12). According to these scores, 203/263 respondents (77.02%) were
134 poor sleepers. Logistic regression showed that mean PSS-14 score was a significant predictor of PSQI
135 score (OR 1.99, $P < 0.05$). During the month preceding the survey, 73 (27.8%) respondents got less than
136 5 hours of sleep per day, 233 (88.6%) reported nighttime disturbances, 97 (36.9%) poor sleep latency,
137 128 (48.7%) daytime dysfunctioning, 94 (35.7%) poor sleep quality and 31 (11.8%) poor sleep
138 efficiency. A few respondents 13 (4.9%) reported using sedatives more than once a week.

139 The chi-squared test revealed a significant association between stress and poor quality of sleep
140 (chi-squared = 5.48, $P < 0.05$). The prevalence of poor quality of sleep among stressed students was
141 82% (129/157), whereas among non-stressed students, only 69.8% were poor sleepers. Independent
142 sample T test revealed a significant association in mean scores of PSQI scale and academic stressors.
143 Those students who reported academic stressors as often/always had a higher mean score on PSQI
144 scale than their counterparts who reported academic stressors as Never/sometimes (Mean difference=
145 1, $P < .05$)

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149 **Discussion**

150 Our sample consisted of medical students enrolled at a privately financed Pakistani medical school
151 which favors a strictly teacher-centered, non-PBL conventional teaching environment. Our results
152 document a high prevalence of psychological stress (59.7%) and poor sleep quality (77%), which is in
153 consonance with earlier studies conducted in Pakistan. Most of the respondents (55.9%) indicated that
154 they often or always experienced academic stressors, and this subgroup was 2.5 times as likely to
155 suffer from psychological stress and poor sleep quality as their non-stressed counterparts. These results
156 underscore the importance of nurturing a positive learning environment for medical students.

157 An interesting finding in our analysis was that both male and female students were equally
158 likely to experience stress and sleep disturbances. This result is consistent with a report by Cohen and
159 colleagues, who found no significant association between stress levels and gender in a sample of
160 college students (15). In 2004, a systematic review of anxiety and depression in the general community
161 reported a higher prevalence of depression in women (mean point prevalence 45.5%) than in men (17).
162 Similarly, according to Shah and colleagues, female medical students were more likely to experience

163 stress than male medical students (1). Our study was based at a privately financed medical school,
164 where most of the medical students belong to higher socioeconomic classes and might be assumed to
165 come from a more tolerant cultural background. Therefore, these students might not be exposed to the
166 same psychosocial stressors as students from a more gender-sensitive and patriarchal environment.
167 Medical students enrolled in their 2nd and 5th (final) year of the MBBS program experienced higher
168 levels of stress. This might be due to the extensive teaching curriculum in the 2nd year, and due to the
169 introduction of clinical subjects and clerkships in the final year of the MBBS degree program.

170 Another interesting finding in our study was that 77% of the medical students reported poor
171 sleep quality, which was significantly associated with academic stressors. A high percentage of
172 respondents (27.8%) got less than 5 hours of sleep per night. This is in consonance with a large-scale
173 study of 2515 Ethiopian university students, 55.8% of whom reported poor sleep quality. That study
174 also reported a strong association between poor sleep quality, stress, anxiety and depression (8). Drug
175 misuse to induce sleep was reported by 4.9% of the students. Zafar et al., in their survey of four
176 universities in Karachi, Pakistan, found a high prevalence of self-medication by students. More than 33
177 (7.6%) of their participants reported insomnia as a reason for self-medication, and 44 (10%)
178 participants admitted to the misuse of sleeping pills (18). The relatively high use of sleep-inducing
179 medication may have been related with the fact that Pakistani pharmacies sell these drugs without a
180 prescription. According to a 2005 survey, an alarming proportion of Pakistani pharmacies (50/311,
181 16.1%) reported selling this type of medication without a prescription (19). Our analysis showed that
182 94 (35.7%) respondents complained of daytime sleepiness. People with daytime sleepiness because of
183 insomnia have lower self-esteem and are three times as likely to be involved in road accidents as their
184 well-rested counterparts (20).

185 Our results are consistent with previous studies at medical schools in Nepal (4) and Pakistan (1)
186 that reported a strong association between academic stressors and psychological morbidity. Both of the

187 schools involved in those studies had a conventional teaching environment. However, the stress
188 associated with a conventional teaching environment can be reduced. The ultimate aim of medical
189 education should be to produce competitive but compassionate, reflective, self-reliant and empathetic
190 doctors. But the stressful environment of medical schools leads to “hardening of [the] heart during
191 medical school” i.e. a decline in the capacity of medical students to empathize (21). Due to academic
192 stress together with high academic and professional expectations, medical students also report suicidal
193 ideation during their school years (22). But these statistics might be underreported in Pakistan because
194 of public stigma revolving around psychiatric illnesses in medical students (23). To address this grave
195 situation, effective screening for psychological stress, anxiety and depression in medical students,
196 along with psychotherapeutic and educational interventions, should be introduced at Pakistani medical
197 schools. Long-term plans should be devised to introduce changes in the medical curriculum to make it
198 less rigid and burdensome on students. New teaching methods should be implemented at Pakistani
199 medical schools to make the learning environment more student-friendly and enjoyable. There is
200 overwhelming evidence that students in the Indian subcontinent perceive positively and welcome PBL
201 methods. A study that compared perceptions towards PBL experiences reported that medical students
202 found these approaches to be better at enhancing team work, interpersonal relationships, motivation
203 and personal enjoyment, and at favoring positive attitudes towards information-gathering, reasoning
204 and independent thinking (24). Students in a PBL curriculum reported better quality of life, perhaps
205 because of the spare time available for self-study and the greater freedom and autonomy to manage
206 their time (25). A randomized controlled trial concluded that mindfulness-based stress reduction
207 programs resulted in mental well-being and improved quality of life in medical and psychology
208 students (26). In their meta-analysis, Shapiro et al. provided overwhelming evidence of improvement
209 in the psychological well-being of medical students who underwent stress reduction programs such as
210 mindfulness-based stress reduction, hypnosis, desensitization, progressive muscle relaxation, social

211 support and group therapy (27). Such programs also improve participants' spirituality, empathy,
212 positive coping skills and conflict resolution skills (27). Studies should be done to determine the
213 feasibility of campus-based psychological support, stress reduction and relaxation-based interventions
214 such as mindfulness training at Pakistani medical schools.

215 The cross sectional design of this study limits inferences about causality and temporality between
216 academic stressors, psychological stress and sleeping difficulties. Our sample size consisted of a
217 representative sample of a single medical school. Therefore, these results are not generalizable to
218 whole student population in Pakistani medical colleges. The use of self-administered questionnaires is
219 an important limitation in this study and it may lead to recall bias. Psychological stress and sleeping
220 disturbances were assessed with psychometric instruments which are not completely transposable to
221 the DSM diagnostic criteria for psychiatric illnesses.

222

223 **Conclusion**

224 Our study revealed a high prevalence of academic stress and poor sleep quality among medical
225 students in Lahore. Many medical students reported using sedatives more than once a week. Academic
226 stressors contributed significantly to perceived stress and sleep disorders.

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235 **References**

236

- 237 1. Shah M, Hasan S, Malik S, Sreeramareddy CT. Perceived stress, sources and severity of stress
238 among medical undergraduates in a Pakistani medical school. *BMC Med Educ* [Internet]. 2010
239 Jan;10:2. Available from:
240 <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2820489&tool=pmcentrez&rendertype=abstract>
241
- 242 2. Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other
243 indicators of psychological distress among U.S. and Canadian medical students. *Acad Med*
244 [Internet]. 2006 May;81(4):354–73. Available from:
245 <http://www.ncbi.nlm.nih.gov/pubmed/16565188>
- 246 3. Sherina MS, Rampal L, Kaneson N. Psychological stress among undergraduate medical
247 students. *Med J Malaysia* [Internet]. 2004 Jul;59(2):207–11. Available from:
248 <http://www.ncbi.nlm.nih.gov/pubmed/15559171>
- 249 4. Sreeramareddy CT, Shankar PR, Binu VS, Mukhopadhyay C, Ray B, Menezes RG.
250 Psychological morbidity, sources of stress and coping strategies among undergraduate medical
251 students of Nepal. *BMC Med Educ* [Internet]. 2007;7:26. Available from:
252 <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1951961&tool=pmcentrez&rendertype=abstract>
253
- 254 5. Abdulghani HM, AlKanhal AA, Mahmoud ES, Ponnampereuma GG, Alfaris EA. Stress and its
255 effects on medical students: a cross-sectional study at a college of medicine in Saudi Arabia. *J*
256 *Health Popul Nutr* [Internet]. 2011 Oct;29(5):516–22. Available from:
257 <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3225114&tool=pmcentrez&rendertype=abstract>
258
- 259 6. Shaikh BT, Kahloon A, Kazmi M, Khalid H, Nawaz K, Khan N KS. Students, stress and coping
260 strategies: a case of Pakistani medical school. *Educ Heal*. 2004;17:346–53.
- 261 7. Stewart SM, Lam TH, Betson CL, Wong CM WA. A prospective analysis of stress and
262 academic performance in the first two years of medical school. *Med Educ*. 1999;33:243–50.
- 263 8. Lemma S, Gelaye B, Berhane Y, Worku A, Williams MA. Sleep quality and its psychological
264 correlates among university students in Ethiopia: a cross-sectional study. *BMC Psychiatry*
265 [Internet]. *BMC Psychiatry*; 2012 Jan;12(1):237. Available from:
266 <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3554495&tool=pmcentrez&rendertype=abstract>
267
- 268 9. Ball S, Bax A. Self-care in medical education: effectiveness of health-habits interventions for
269 first-year medical students. *Acad Med*. 2002;77:911–7.

- 270 10. Crandall SJ, Volk RJ, Loemker V. Medical students' attitudes toward providing care for the
271 underserved. Are we training socially responsible physicians? *JAMA*. 1993;269:2519–23.
- 272 11. Anjum A, Bajwa MA, Saeed R. Sleep patterns; among medical and non-medical students of
273 university of lahore, 2010-11 *Professional Med J*. 2014;21(1):148–56.
- 274 12. Suchecki D, Machado RB, Tiba PA. Stress-induced sleep rebound: adaptive behavior and
275 possible mechanisms." *Sleep* (2009); 2(3):151-160.
- 276 13. Davies SK, Ang JE, Revell VL, Holmes B, Mann A, Robertson FP, Cui N, Middleton B,
277 Ackermann K, Kayser M, Thumser AE, Raynaud FI, Skene DJ. Effect of sleep deprivation on
278 the human metabolome. *Proc Natl Acad Sci U S A* [Internet]. 2014 Jul 22;111(29):10761-6;
279 Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25002497>
- 280 14. Curcio G, Ferrara M, De Gennaro L. Sleep loss, learning capacity and academic performance.
281 *Sleep Med Rev*. 2006 Oct;10(5):323-37 Available from:
282 <http://www.ncbi.nlm.nih.gov/pubmed/16564189>
- 283 15. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*.
284 1983;24(4):385–96.
- 285 16. Buysse DJ, Reynolds CF, Monk TH, Berman S, Kupfer D. The Pittsburgh Sleep Quality Index:
286 a new instrument for psychiatric practice and research. *Psychiatry Res*. 1989;28:193–213.
- 287 17. Mirza I, Jenkins R. Risk factors, prevalence, and treatment of anxiety and depressive disorders
288 in Pakistan: systematic review. *BMJ*. 2004 Apr 3;328(7443):794.
- 289 18. Zafar SN, Syed R, Waqar S, Zubairi AJ, Vaqar T, Shaikh M, Yousaf W, Shahid S, Saleem S.
290 Self-medication amongst university students of Karachi : prevalence , knowledge and attitudes. *J*
291 *Pakistan Med Assoc*. 2008;58(4):214–7.
- 292 19. Butt ZA, Gilani AH, Nanan D, Sheikh AL, White F. Quality of pharmacies in Pakistan : a cross-
293 sectional survey. *Int J Qual Healthc*. 2005;17(4):307–13.
- 294 20. Garbarino S, De Carli F, Nobili L, Mascialino B, Squarcia S, Penco MA, Beelke M, Ferrilla F.
295 “Sleepiness and sleep disorders in shift workers: a study on a group of Italian police officers.”
296 *Sleep*. *Sleep*. 2002;25(6):648–53.
- 297 21. Newton BW, Barber L, Clardy J, Cleveland E, O’Sullivan P. Is there hardening of the heart
298 during medical school? *Acad Med* [Internet]. 2008 Mar;83(3):244–9. Available from:
299 <http://www.ncbi.nlm.nih.gov/pubmed/18316868>
- 300 22. Hershner SD, Chervin RD. Causes and consequences of sleepiness among college students. *Nat*
301 *Sci Sleep* [Internet]. 2014 Jun;6:73–84. Available from:
302 <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4075951&tool=pmcentrez&renderty>
303 [pe=abstract](http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4075951&tool=pmcentrez&renderty)

- 304 23. Waqas A, Zubair M, Ghulam H, Wajih Ullah M, Zubair Tariq M. Public stigma associated with
305 mental illnesses in Pakistani university students: a cross sectional survey. PeerJ. 2014 Dec
306 16;2:e698. doi: 10.7717/peerj.698. eCollection 2014.
- 307 24. Nandi PL, Chan JN, Chan CP, Chan P, Chan LP. Undergraduate medical education: comparison
308 of problem-based learning and conventional teaching . Hong Kong Med J. 2000 Sep;6(3):301-6
- 309 25. Tempski P, Bellodi PL, Paro HB, Enns SC, Martins MA, Schraiber LB. What do medical
310 students think about their quality of life? A qualitative study. BMC Med Educ. 2012 Nov
311 5;12(1):106. Available from:
312 <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3527341&tool=pmcentrez&rendertype=abstract>
313
- 314 26. De Vibe M, Solhaug I, Tyssen R, Friberg O, Rosenvinge JH, Sørli T, Bjørndal A. Mindfulness
315 training for stress management: a randomised controlled study of medical and psychology
316 students. BMC Med Educ [Internet]. 2013 Jan [cited 2014 Oct 20];13:107. Available from:
317 <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3751423&tool=pmcentrez&rendertype=abstract>
318
- 319
- 320 27. Shapiro SL, Shapiro DE, Schwartz GE. Stress management in medical education: a review of
321 the literature. Acad Med [Internet]. 2000 Jul;75(7):748-59. Available from:
322 <http://www.ncbi.nlm.nih.gov/pubmed/10926029>

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Table 1 (on next page)

Determinants of stress according to logistic regression analysis.

Table 1: Determinants of stress according to logistic regression analysis. $R^2 = 0.095$ (Cox & Snell), 0.128 (Nagelkerke). Model chi-squared value = 26.258 (df =11)

Notes: * $P < 0.05$ ** $P < 0.01$

2 Table 1: Determinants of stress according to logistic regression analysis. $R^2 = 0.095$ (Cox & Snell),
 3 0.128 (Nagelkerke). Model chi-squared value = 26.258 (df =11)

Determinants	Odds ratio (OR)	95% CI for OR
Age	0.880	0.651-1.190
Gender		
Female	1	
Male	1.339	0.748-2.397
Residence		
National	1	
International	0.914	0.508-1.645
Residence		
Off-campus residence	1	
On-campus residence	1.291	0.606-2.750
Year*		
1st	0.197	0.039-.999
2nd	0.563	0.151-2.11
3rd	0.291	0.086-0.987
4th	0.347	0.126-0.957
5th	1	
Psychosocial stressors	1.231	0.571-2.652
Academic stressors**	2.470	1.424-4.284
Health-related stressors	0.818	0.389-1.721

4

5 Notes:

6 * $P < 0.05$

7 ** $P < 0.01$.

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Table 2 (on next page)

Frequency and severity of academic stressors

Table 2: Frequency and severity of academic stressors

2 Table 2: Frequency and severity of academic stressors

Academic stressors	Often/Always response, n (%)	Severity (1 – lowest to 10 – highest)
Exam frequency	190 (73.6)	7
Academic performance	148 (57.4)	7
Academic curriculum	125 (48.4)	6
Dissatisfaction with class lectures	86 (33.3)	6
Unavailability of learning materials	55 (21.3)	5
Becoming a doctor	106 (41.1)	6
Lack of leisure time	123 (47.7)	6
Competition with peers	77 (29.8)	5
Performance in practical	73 (28.3)	5
Lack of special guidance from faculty	70 (27.1)	5

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Table 3 (on next page)

Frequency and severity of psychosocial stressors

Table 3: Frequency and severity of psychosocial stressors

2 Table 3: Frequency and severity of psychosocial stressors

Psychosocial stressors	Often/Always response, n (%)	Severity of stressors (1 – lowest to 10 – highest)
High parental expectations	137 (53.1)	7
Loneliness	64 (24.8)	5
Family problems	62 (24)	5
Living away from home	66 (25.6)	6
Political situation of country	42 (16.3)	5
Relations with opposite sex	41 (15.9)	5
Difficulty reading textbooks	51 (19.8)	5
Lack of entertainment in Lahore	71 (27.5)	5
Difficulty with the journey back home	45 (17.4)	5
Quality of cafeteria food	100 (38.8)	7
Financial strain	49 (19)	5
Inability to socialize with peers	26 (10.1)	7
Living conditions in student residence	49 (19)	6
Member of fraternity or sorority	14 (5.4)	5
Lack of personal interest in medicine	28 (10.9)	5
Adjustment with roommate	37 (14.3)	5

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Table 4(on next page)

Frequency and severity of health-related stressors

Table 4: Frequency and severity of health-related stressors

2 Table 4: Frequency and severity of health-related stressors

Health-related stressors	Often/Always response, n (%)	Severity (1 – lowest to 10 – highest)
Power failures	139 (53.9)	7
Difficulty sleeping	101 (39.1)	6
Class attendance	112 (43.4)	7
Nutrition	75 (29.1)	6
Exercise	77 (29.8)	6
Quality of cafeteria food	85 (32.9)	7
Physical disability	10 (3.9)	5
Substance abuse	16 (6.2)	5

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