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The relationship between the burnout syndrome and academic success of medical students: a cross-sectional study

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The burnout syndrome may affect academic achievement, but research on burnout and academic success of medical students is sparse. This research aimed to estimate the prevalence of high risk of burnout in students of medicine and to investigate its association with academic performance. It included 760 full-time medical students who completed the survey (response rate = 90.9 %). A significant independent predictor for high burnout risk in students with lower grade point average (GPA) was male gender (adjusted OR=2.44; 95 % CI=1.14–5.23; P=0.022). Among students with higher GPA, high burnout risk was associated with the use of sedatives (adjusted OR=6.44; 95 % CI=1.80–22.99; P=0.004).

KEY WORDS: academic achievement; grade point average; risk factors; sedatives

Academic burnout can be recognised by a high level of cynicism, high level of exhaustion, and low performance (1–4). It involves the feeling of exhaustion due to high academic demands (emotional exhaustion is defined as severe fatigue caused by the educational demands of studies and represents the basic individual component of stress in the burnout syndrome), a cynical and disinterested attitude towards studying (cynicism is defined as a student's mental detachment from his studies and represents the interpersonal component of the burnout syndrome), and the feeling of incompetence as a student (lower academic efficacy or performance is defined as the feeling of declining competence and productivity and the feeling of reduced achievement and is a component of self-evaluation) (3–5).

Faced with social and academic pressures, students run the risk of burnout, which can severely limit their psychosocial well-being and academic performance (6). This risk is even more pronounced in medical students all over the world, as they are expected to make enormous effort and learn infinite amounts of information, master the skills and knowledge necessary to treat people, engage in numerous activities at the university (with limited time and energy), manage in a highly competitive environment, and come to terms with patients with severe diseases and a poor prognosis (7–10). Recent meta-analyses show that almost every second student of medicine in the developed countries had a form of burnout syndrome during their studies (11–13), while individual studies report burnout incidence to range between 10.2 % and 71.2 % of the student population (14–16). Research further indicates that if medical students experience at least one symptom of the burnout syndrome, this can lead to adverse effects which not only affect the studying but also lead to drowsiness, fatigue, migraines, eating disorders, emotional instability, and use of psychotropic substances (17–19).

Studies that report an association between burnout and academic performance in medical students are often inconsistent (20–21) and some point to a role of study duration, marital status, interest in the field of study, parents' education levels, gender, and grade point average (GPA) (22–26) as the most common measure of academic success (2, 27). As an important reference for future professional career, GPA can be a source of additional stress and a predictor of the burnout syndrome (3, 28).

However, to the best of our knowledge, studies looking for associations between GPA and other characteristics of medical students (such as gender, habits, housing, and study financing) and the impact of these associations on burnout are relatively scarce. In our earlier study (29) analysing gender differences in burnout risk among medical students in Kragujevac, Serbia, we found no difference in GPA between genders (GPA>8 was self-reported by 62.8 % of males and by 64.2 % of females, P=0.716), but high burnout risk significantly prevailed in male than female students (19.0 % versus 12.8 %, respectively, P=0.024). The aim of this study, however, was to look deeper and assess in the same sample of students how burnout may affect academic performance in view of other factors associated with it.

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PARTICIPANTS AND METHODS

Study design

This cross-sectional study included 760 full-time university medical students from the first to sixth year at the Kragujevac University Faculty of Medical Sciences of the invited 836 (90.9 % response rate), as described in our previous report (29). Their curriculum includes preclinical training (first three study years) and clinical training (study years 4–6).

The respondents completed the survey (on paper) anonymously, and participation was voluntary. They had about 15 (±5) min to fill out the survey and were supervised by a medical doctor specialised for burnout assessment. Students who did not cooperate and/or did not complete the survey were excluded from analysis.

The sample size was calculated using the Epi Info statistical calculator (Centers for Disease Control and Prevention, Atlanta, GA, USA) based on the population of 836, acceptable margin of error of 5 %, expected prevalence of 22.6 % (30), and confidence level of 99.99 %. The obtained sample size was corrected to account for non-response rate of 15 %, yielding the minimum sample of 538 participants.

Ethical considerations

This study is part of a research approved by the Ethics Committee of the Kragujevac University Faculty of Medical Sciences (Ref. No.: 01-1176). All participants provided a written informed consent prior to taking part.

Instruments

The survey included an epidemiological questionnaire and the Maslach Burnout Inventory – Student Survey (MBI-SS) (2). The epidemiological questionnaire included questions about sociodemographic characteristics, such as age (years: ≤21 / 22–24 / ≥25), having children (No / Yes), overall GPA (≤8 / >8) on a 10-point scale (with passing score 6), study year (1–6), whether the study year was retaken (No / Yes), number of exams passed (dichotomised: ≤23 / >23), length of study (dichotomised: ≤6 year / >6 years), training (preclinical: first-three year of study; clinical: study year four through six), total time spent in classes per day (average number of hours of classes attended per day, dichotomised: ≤5 h / >5 h), total time spent studying per day (average number of study hours per day, dichotomised: ≤5 h / >5 h), study financing (state-sponsored / self-funded), housing model (own home / with parents / rent / student dormitory), habits (cigarette smoking, alcohol consumption: No / Yes), personal medical history of chronic disease (No / Yes), use of sedatives (No / Yes), and use of psychoactive substances (No / Yes). If the students regularly smoked at least one cigarette per day for one year they were considered smokers. If they smoked at least one cigarette every day over the past 12 months they were considered current smokers. Ex-smokers were those who had quit smoking for more than a year before taking the survey. All data are self-reported and were not verified.

The MBI-SS questionnaire is a version of the Maslach Burnout Inventory designed to measure the level of the burnout syndrome in students by Schaufeli et al. (2), which consists of 15 items/statements in three subscales: emotional exhaustion (5 items), cynicism (4 items), and academic efficacy (6 items). Students were asked to score the accuracy of each statement in terms of frequency on a 7-point Likert-type scale ranging from 0 to 6 (0 – never; 1 – several times a year; 2 – once a month; 3 – several times monthly; 4 – once a week; 5 – several times a week; 6 – daily). Scores higher than 14 for emotional exhaustion, higher than 6 for cynicism, and lower than 23 for academic efficacy are considered indicative of high burnout risk (2, 31, 32).

After obtaining a license from the current owner, Mind Garden (Menlo Park, CA, USA) for the use of the MBI-SS questionnaire, the questionnaire was translated into Serbian, adapted, and validated. The three subscales (explaining the variance of 64.9 %) had satisfactory Cronbach's α coefficients (0.869 for emotional exhaustion, 0.856 for cynicism, and 0.852 for academic efficacy) and good test-retest reliability (33).

Statistical analysis

All statistical analyses were run on the SPSS program version 19 (SPSS Inc., Chicago, IL, USA). Categorical variables are expressed in percentages and were compared with the chi-squared test to determine differences between medical students with a lower GPA and those with a higher GPA. Univariate and multivariate regression analysis were used to establish the relationship between the burnout syndrome and academic performance [odds ratio (OR) with 95 % confidence interval (95 % CI)].

The multivariate logistic regression model included all variables that univariate analyses determined as related to the burnout syndrome (P<0.10). In order to assess the effect of potential confounding variables, ORs were adjusted for all variables determined as related to the burnout syndrome by univariate analyses (P<0.10) and for other variables that had been reported to correlate with the burnout syndrome by literature (including age, study year, marital status, children, housing, completed secondary school, study financing, re-enrolment in the academic year, length of study, cigarette smoking, alcohol consumption, sports, recreational activity, and positive personal medical history of chronic diseases).

Training (preclinical and clinical) was not included in the multivariate model because of its collinearity with age and some of the study years. Model fit was assessed with the Hosmer-Lemeshow test of goodness of fit and Cox and Snell's and Nagelkerke's pseudo R-squared measures. The test for linear trend in risk was based on the logistic regression model. All statistical analyses were performed separately for medical students with a lower GPA (≤8) and with a higher GPA (>8). A value of P<0.05 was considered significant.

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RESULTS

Table 1 shows the distribution of medical students by academic performance, and Table 2 compares categorical variables between the groups with GPA score ≤8 and >8. For the sake of clarity, only the variables with significant differences between the GPA groups are shown (P<0.05).

However, the two GPA groups do not significantly differ in the prevalence of high burnout risk (Table 3).

Multivariate logistic regression analysis singled out study year 3 as a significant independent predictor of high burnout risk for all medical students(OR=6.09; 95 % CI=2.40–15.49; P=0.000), but the risk has a significantly decreasing trend with higher years of study (P=0.000) (Table 4).

However, within the GPA group the multivariate logistic regression analysis has singled out male gender as a significant independent predictor of high burnout risk in medical students with GPA ≤8 (adjusted OR=2.44; 95 % CI=1.14–5.23; P=0.022) (Table 5) and use of sedatives among students with GPA >8 (adjusted OR=6.44; 95 % CI=1.80–22.99; P=0.004).

Table 1 Distribution of medical students by variables and academic performance

Variables		Students (N=760)	%
Study year	1	93	12.2
	2	92	12.1
	3	99	13.0
	4	138	18.2
	5	173	22.8
	6	165	21.7
Study year retaken	No	575	75.7
	Yes	185	24.3
Length of study (years)	≤6	643	84.6
	>6	117	15.4
Training	Preclinical	284	37.4
	Clinical	476	62.6
Number of passed exams	≤23	436	57.4
	>	324	42.6
Average number of hours of classes attended per day	≤5	644	84.7
	>5	116	15.3
Average number of study hours per day	≤5	521	68.6
	>5	239	31.4
Grade point average	≤8	276	36.3
	>8	484	63.7

DISCUSSION

Many studies have shown that the risk of the burnout syndrome drops with high GPA and vice versa (20, 28, 34–39). This is in line with our findings, considering that the majority of our medical students (484/760; 63.7 %) had a high GPA (>8). However, our GPA scores should be taken with some reserve, as they are self-reported and have not been verified independently.

As for the higher burnout risk in male students with lower GPA (≤8), literature reports controversial findings (36, 40–43). In our earlier report on the same sample of students analysing gender differences in burnout risk (29), we found no difference in GPA between genders (GPA>8 was self-reported by 62.8 % of males and by 64.2 % of females, P=0.716), but high burnout risk prevailed significantly in male than female students (19.0 % versus 12.8 %, respectively, P=0.024). However, these findings should also be taken with reserve, as the male and female groups did not match (491 female vs 269 male students in the total sample). Besides, they may also reflect the existence of confounding associations between gender and other characteristics (44). Maslach (44) believes that gender is not a relevant predictor for the burnout syndrome and that the differences between men and women are very small or non-existent.

Another interesting finding in our current study is the significantly higher risk of burnout in students with GPA >8 using sedatives. In fact, sedative use was recorded in 7.9 % of medical students with higher GPA and in 2.6 % of students with lower GPA, as reported earlier (29). In a study at the University of Belgrade, the use of sedatives was recorded in 2.6 % of medical students but was not associated with the burnout syndrome (45). In contrast, regular use of legal substances (including pain relief drugs, sedatives, cough drugs, steroids, antidepressants, caffeine) among medical students in Iraq was significantly related to high burnout rates (46). It is uncertain whether the use of sedatives directly causes students to burn out more, or students who are already underperforming turn to sedatives (or recreational drugs) to deal with high stress levels (47). In our study, however, it is medical students with a high GPA and high burnout risk who reported using sedatives. Perhaps the significant association between sedative use and high risk of burnout in our medical students with higher GPA is owed to high competitive pressure to achieve high academic success that opens the door to a desired specialty. In contrast, a multicentre study in France (48) reports that it is unclear whether self-medication serves to cope with stress, or there are other reasons (including pleasure/novelty seeking). In a recent meta-analysis, Koutsimani et al. (49) suggest that there *is* an association between burnout and depression, as well as between burnout and anxiety, and that the use of sedatives is an attempt to cope with stress and resulting mental health problems (such as depression, drug abuse, alcoholism, and sleep disorders). Since education on drug abuse is part of the core curriculum of medical schools (50, 51), this association should be investigated in future studies.

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Table 2 Characteristics of respondents by grade point average

Variables		≤8 N=276 (%)	>8 N=484 (%)	P*
Age (years)	≤21	16 (5.8)	161 (33.3)	0.000
	22–24	109 (39.5)	218 (45.0)	
	≥25	151 (54.7)	105 (21.7)	
Children	No	262 (94.9)	476 (98.3)	0.007
	Yes	14 (5.1)	8 (1.7)	
Housing	In own home	23 (8.3)	47 (9.7)	0.000
	With parents	89 (32.2)	178 (36.8)	
	As subtenants	158 (57.3)	188 (38.8)	
	In student dormitory	6 (2.2)	71 (14.7)	
Study financing	State-sponsored	156 (56.5)	438 (90.5)	0.000
	Self-funded	120 (43.5)	46 (9.5)	
Study year	1	10 (3.6)	83 (17.1)	0.000
	2	10 (3.6)	82 (16.9)	
	3	19 (6.9)	80 (16.5)	
	4	68 (24.6)	70 (14.5)	
	5	91 (33.0)	82 (16.9)	
	6	78 (28.3)	87 (18.1)	
Study year retaken	No	129 (46.7)	446 (92.1)	0.000
	Yes	147 (53.3)	38 (7.9)	
Length of study (years)	≤6	191 (69.2)	452 (93.4)	0.000
	>6	85 (30.8)	32 (6.6)	
Number of passed exams	≤23	119 (43.1)	317 (65.5)	0.000
	>23	157 (56.9)	167 (34.5)	
Cigarette smoking	Never	157 (56.9)	360 (74.4)	0.000
	Ever	119 (43.1)	124 (25.6)	
Smoking status	Never smoker	157 (56.9)	360 (74.4)	0.000
	Former smoker	50 (18.1)	50 (10.3)	
	Current smoker	69 (25.0)	74 (15.3)	
Use of sedatives	No	629 (97.4)	105 (92.1)	0.004
	Yes	17 (2.6)	9 (7.9)	
Use of psychoactive substances	No	642 (99.4)	110 (96.5)	0.005
	Yes	4 (0.6)	4 (3.5)	

* chi-squared test; SD – standard deviation

As for the other characteristics of academic performance (length of study, number of exams passed) or socio-demographic/lifestyle variables (housing, study financing, cigarette smoking), we found no significant association between GPA and high burnout risk.

Study limitations

This study has several limitations. In addition to the known limitations of the cross-sectional study design, we did not determine the burnout risk before the students enrolled for the medical study.

There is also the limitation of self-reporting, which cannot rule out information bias, especially in terms of self-reported GPA.

This study focused on personal variables rather than environmental factors (such as relationships with colleagues and teachers) and did not look into other potential predictors of the burnout syndrome (such as socioeconomic status, employment status of students, or parents' occupation). In addition, although the response rate is high, there may still be some response bias, as students suffering from the burnout syndrome may not have been

Table 3 High burnout risk in medical students by grade point average

| Grade point average | Burnout syndrome – high risk | | P* |
| | Absent | Present | |
	N (%)	N (%)	
≤8	229 (83.0)	47 (17.0)	0.270
>8	417 (86.0)	67 (14.0)	
Total	646 (85.0)	114 (15.0)	

* chi-squared test

Table 4 High burnout risk in medical students – according to academic performance

| Variables | | Univariate logistic regression | | | Multivariate logistic regression | | |
		OR	95 % CI	P	OR	95 % CI	P
Study year	1	1.00*			1.00*		
	2	1.01	0.31–3.26	0.985	1.02	0.32–3.28	0.977
	3	6.30	2.48–16.01	0.000	6.09	2.40–15.49	0.000
	4	2.04	0.77–5.38	0.151	1.61	0.59–4.40	0.355
	5	2.80	1.12–7.03	0.028	2.17	0.84–5.63	0.110
	6	2.84	1.13–7.15	0.027	2.00	0.75–3.04	0.167
	**P for trend			0.000			0.000
Study year retaken	No	1.00*			1.00*		
	Yes	1.70	1.10–2.61	0.016	1.51	0.75–5.36	0.244
Length of study (years)	≤6	1.00*			1.00*		
	>6	1.69	1.03–2.78	0.038	1.17	0.54–2.52	0.694
Training	Preclinical	1.00*					
	Clinical	1.03	0.68–1.55	0.900			
Number of passed exams	≤23	1.00*					
	>23	1.11	0.74–1.65	0.622			
Grade point average	≤8	1.00*			1.00*		
	>8	0.69	0.46–1.03	0.070	0.85	0.52–1.39	0.506
Average number of hours of classes attended per day	≤5	1.00*					
	>5	1.91	0.83–4.40	0.129			
Average number of study hours per day	≤5	1.00*					
	>5	0.95	0.48–1.91	0.894			

Abbreviations: OR (Odds Ratio); 95 % CI (95 % Confidence Interval); P (according to logistic regression analysis). *Reference category; **P for trend (according to logistic regression analysis).

Table 5 High burnout risk in medical students by grade point average (multivariate logistic regression analysis)

Grade point average	Variables	Adjusted* OR	95 % CI	P***
≤8	**Gender**			
	Female	1.00**	1.14–5.23	0.022
	Male	2.44		
>8	**Use of sedatives**			
	No	1.00**	1.80–22.99	0.004
	Yes	6.44		

*Adjusted for age, study year, marital status, children, housing, completed secondary school, study financing, re-enrollment in the academic year, length of study, cigarette smoking, alcohol consumption, sports, recreational activity, positive personal medical history of chronic diseases, and use of psychoactive substances; **Reference category, ***logistic regression analysis, 95 % CI – 95 % confidence interval); OR – odds ratio

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in class at the time of data collection or may have chosen not to participate.

CONCLUSIONS

Despite its limitations, our study has singled out the association between high burnout risk and sedative use in medical students with high GPA and male gender in medical students with lower GPA. It also opens a number of questions that need to be addressed by further research.

Conflict of interests

None to declare.

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Odnos između sindroma izgaranja i akademskog uspjeha studenata medicine: studija presjeka

Sindrom izgaranja može negativno utjecati na akademski uspjeh, ali nema mnogo istraživanja povezanosti akademskog uspjeha i izgaranja u studenata medicine. Svrha našeg istraživanja bila je procijeniti ne samo prevalenciju visokog rizika od sindroma izgaranja nego i povezanost s akademskim uspjehom (prosjek ocjena) u 760 redovitih studenata medicine koji su odgovorili na upitnike (postotak odaziva = 90,9 %). Statistička procjena provedena je logističkom regresijskom analizom, omjerom izgleda (OR) i odgovarajućim 95-postotnim intervalom pouzdanosti (95 % CI). Značajan neovisni prediktor visokog rizika od izgaranja u studenata medicine s nižim prosjekom ocjena bio je muški spol (prilagođeni OR=2,44; 95 % CI=0,14–5,23; P=0,022). Korištenje sedativa bilo je povezano s visokim rizikom od izgaranja među studentima medicine s višim prosjekom ocjena (prilagođeni OR=6,44; 95% CI=1,80–22,99; P=0,004).

KLJUČNE RIJEČI: akademski uspjeh; prosjek ocjena; rizični čimbenici; sedativi