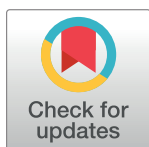


RESEARCH ARTICLE

Predictors of burnout among Belgrade veterinary students: A cross-sectional study

Jelena Ilić Živojinović¹, Dušan Backović¹, Goran Belojević¹, Olivera Valčić², Ivan Soldatović³, Janko Janković^{4*}

1 Institute of Hygiene and Medical Ecology, Faculty of Medicine, University of Belgrade, Belgrade, Serbia, **2** Department of Physiology and Biochemistry, Faculty of Veterinary Medicine, University of Belgrade, Belgrade, Serbia, **3** Institute of Medical Statistics and Informatics, Faculty of Medicine, University of Belgrade, Belgrade, Serbia, **4** Institute of Social Medicine, Faculty of Medicine, University of Belgrade, Belgrade, Serbia

* drjanko.jankovic@yahoo.com

OPEN ACCESS

Citation: Ilić Živojinović J, Backović D, Belojević G, Valčić O, Soldatović I, Janković J (2020) Predictors of burnout among Belgrade veterinary students: A cross-sectional study. PLoS ONE 15(3): e0230685. <https://doi.org/10.1371/journal.pone.0230685>

Editor: Sergio A. Useche, Universitat de Valencia, SPAIN

Received: November 27, 2019

Accepted: March 5, 2020

Published: March 24, 2020

Peer Review History: PLOS recognizes the benefits of transparency in the peer review process; therefore, we enable the publication of all of the content of peer review and author responses alongside final, published articles. The editorial history of this article is available here: <https://doi.org/10.1371/journal.pone.0230685>

Copyright: © 2020 Ilić Živojinović et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Data Availability Statement: All relevant data are within the manuscript.

Funding: The study was funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia (project No.

Abstract

Background

To the best of our knowledge, studies are lacking on burnout among veterinary students in Serbia, and this is the first study trying to address such a problem. Therefore, the aim of this cross-sectional study was to investigate the predictors of burnout among Belgrade veterinary students.

Methods

Maslach Burnout Inventory (MBI) and anonymous structured questionnaire addressed to personal data, health habits and stressful influence of educational process were applied among 496 respondents from a total of 1113 students from all grades in spring semester 2014 (response rate 44.6%).

Results

The prevalence of burnout was 43.3%. High scores on depersonalization and emotional exhaustion scales of MBI were found among 79.4% and 45.0% students, respectively; low personal accomplishment was reported by 50.5% students. Female students reported higher levels of emotional exhaustion compared to males ($p = 0.012$). A low score on personal achievement scale of MBI was least frequent among the freshmen and most frequent among sophomores (41.1% and 65.3%, respectively; $p = 0.986$). There were more students with burnout who considered their health as a worsened vs. pre-study period compared to students with no burnout, both concerning mental (61.4% vs. 38.6%) and physical health (61.1% vs. 38.9%; both $p < 0.001$). There were more smokers among students who suffered from burnout compared to students who did not (52.0% vs. 48.0%; $p = 0.013$). A multiple regression revealed an independent dose-response effect of perceived stress at exams on the onset of burnout (moderate stress OR = 2.164 and high stress OR = 3.878). Also, students with the moderate and high stressful effect of communication with teaching staff, as

175078). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing interests: The authors have declared that no competing interests exist.

well as, those with worse self-perceived physical and mental health had more than two times higher presence of burnout.

Conclusions

The prevalence of burnout among Belgrade veterinary students is relatively high. Primary prevention should be focused on the revealed predictors of burnout.

Introduction

Numerous negative environmental and psychosocial stressors such as excessive academic obligations, lack of free time, constant pressure to succeed, as well as social determinants of health, including low socioeconomic status, social support, neighborhood environments, exposure to violence, and family conflicts, contribute to emerging health disorders among university students [1–3]. Stress in academic institutions may have a positive effect by increasing self-confidence, but on the other hand, it may negatively affect health in the form of distress [4].

Studying veterinary medicine is often associated with prolonged exposure to academic and non-academic stressors such as: heavy workload [5], efforts to maintain high academic performance [6], difficulty fitting in and unclear expectations [7], hazardous alcohol consumption [8], homesickness and poorer perceived physical health [9] and financial stress [10]. Exposure to work-related stress may continue from academic settings to later veterinarian professional career. Burnout has been increasingly reported in academic and university settings [11–14] and studies from various countries have confirmed that veterinary students have a high risk of burnout [15–17]. The basic characteristics of burnout are feelings of emotional and physical exhaustion, depersonalization, and reduced personal job satisfaction [18].

Concerning health professions, the studies on stress among medical students are dominant, while similar studies among veterinary students are lacking [19,20]. Stress can result in a number of physical and psychological changes which in turn can affect the wellbeing and performance of veterinary students; those who come from calm rural areas to hectic cities are particularly under a raised risk of burnout [21].

There are concerns about the difficulty of a demanding curriculum, time dedicated to learning and the amount of information on all animal species that a veterinary student is expected to adopt [22]. New curricula at the majority of European veterinary schools are adapted to the Bologna process in which greater emphasis is on learning by the student, rather than teaching by the teachers [23]. These curricula introduce a more rigorous program that involves constant checking of students' knowledge through colloquiums and seminars. In addition, the students do not feel academically ready for some of the topics in the first year of studies; it causes loss of interest towards the subjects for which they do not have an adequate knowledge [24,25].

Burnout affects professional development; it may cause reduced professional interest, and further degradation of humanitarian attitudes such as empathy [26]. Monitoring of this syndrome is particularly important at the beginning of studies, when typically, the first symptoms occur. Researches on predictors of burnout are very important for planning and implementation of preventive measures and the use of appropriate coping strategies [27].

In spite of a relatively high risk of burnout among veterinary students, studies of burnout among them are infrequent. For this reason, we have undertaken this very first study on burnout and its correlates among veterinary students in Serbia. We hypothesize that the prevalence of burnout among Belgrade veterinary students is very high.

Method

Study design and sample

We performed a cross-sectional study on 496 students (males = 329; 66.3%), of all grades at the Faculty of Veterinary Medicine, University of Belgrade during the spring semester 2014. They study according to a five-year curriculum adapted to the Bologna system. A student takes one colloquium per semester for each subject, as well as a large number of laboratory exercises and seminars. The response rate was 44.6% (496 respondents from 1113 students). The distribution of respondents according to grade was as follows: 124—first year in school, 108—second year in school, 83—third year in school, 66—fourth year in school and 115—fifth year in school. Students were recruited during their laboratory classes and participation was voluntary. A paper questionnaire was completed at the beginning of a class and the instructions were given by the first author. Prior to filling out the questionnaire, all students provided written informed consent to anonymously participate in the study, as well as, gave permission to researchers for using the data.

The study was performed with the permission of the Ethics Committee of the Faculty of Medicine, University of Belgrade (decision No. 29/III-16).

Study variables

Students completed the Maslach Burnout Inventory (MBI) and an anonymous questionnaire. The Serbian version of MBI is a reliable and valid instrument for measuring burnout, with strong psychometric characteristics of the study instrument, confirmed in a recent Belgrade study [28]. The overall reliability of the scores is sufficient (Cronbach's $\alpha = 0.72$) with the highest internal consistency value for the scale of emotional exhaustion (Cronbach's $\alpha = 0.91$) and similar values for depersonalization (DP) and low personal accomplishment (PA). It demonstrates similar reliability to its corresponding original English form, found by Maslach and Jackson [29]. The MBI is a 22-item instrument describing the feelings of a person about his/her job. It consists of three subscales to evaluate each domain of burnout, namely emotional exhaustion (EE), DP and PA [18]. The question "I feel burned out from my work" refers to EE, and the question "I have become more callous toward people since I took this job" is related to DP. "I deal very effectively with the problems of other people" is the question on personal accomplishment [30] Likert scale of seven degrees of the frequency of occurrence of burnout symptoms (0 = never, 1 = a few times a year; 2 = once a month or less; 3 = a few times a month; 4 = once a week; 5 = a few times a week; 6 = every day) is applied in MBI. Scores on each scale can be categorized as low, average or high levels of burnout according to cut-offs detailed in the MBI manual [29]. High EE is defined as scoring ≥ 27 , high DP score is ≥ 10 , and low PA score is ≤ 33 . A person has a burnout if he/she scores high on EE and DP scales [31]. A structured questionnaire included personal data of each student: gender, year of study, number of passed exams, average grade, smoking and drinking habits, physical activity, perceived stressful influence of exams, colloquiums, communication with the teaching staff, contact with the pet owner and field work, self-assessed physical and mental health

Statistical analysis

The sample size calculation is based on previous studies. It is assumed that the prevalence of burnout in veterinary students is 30%. The sample size of 341 is sufficient to produce a 95% confidence interval with a width of 10% (precision is 5%) when the sample proportion is 30%. In our study sample size reached 496 students in total.

All analyses were performed using SPSS 20 (SPSS Inc., Chicago IL). Descriptive statistics included count (percent) or mean (standard deviation) depending on the data type. Groups were compared using Pearson chi-square or Cochran-Armitage test for trend for attributive data (nominal and ordinal) and t-test and ANOVA for numerical data. Numerical data were examined for normal distribution. Normal distribution was evaluated using graphical methods (Q-Q plot, histogram, boxplot), descriptive statistics (mean, standard deviation and median) and tests for normality (Kolmogorov-Smirnov).

Multiple regression analysis was used to evaluate the investigated factors that independently correlate with burnout (gender, self-assessed physical and mental health and stressful influence of exams, communication with the teaching staff and field work). The dependent variable was a high combined score on subscales EE and DP of MBI [31]. Independent variables included significant predictors in univariate analysis. Modeling was performed in several steps. First, the enter method [32] was employed. The probability of alpha error less than 0.05 was considered significant.

Results

The majority of students reported high levels of DP (79.4%); about half of them experienced low levels of PA or high levels of EE (50.5% and 45%, respectively) (Table 1). Overall, 43.3% of participants met the criteria for burnout.

There was no significant impact of gender or year of study on the prevalence of burnout. Females more frequently reported higher levels of EE compared to male students. A low PA score was least frequent among freshmen (41.1%) and most frequent among the second year (65.3%) and fourth-year students (50.8%).

There was no statistically significant difference neither in mean grade ($p = 0.811$) nor in the number of passed exams ($p = 0.809$), physical activity ($p = 0.785$) and alcohol consumption (0.104) between the students with and without burnout (Table 2).

There were more smokers among students who suffered from burnout (52.0%) compared to students who did not (48.0%, $p = 0.013$). The majority of students with burnout considered their mental and physical health worsened compared to the pre-study period ($p = 0.001$) (Table 2).

Student's responses to the perceived stress impact of exams resulted in a highly significant difference in relation to the presence of burnout ($p < 0.001$) (Table 3).

The highest percentage of students who perceived exams as very stressful was in the group with burnout (58.8%). Also, students with burnout perceived colloquiums, communications with teaching staff and contact with pet owners as more stressful in comparison to students without burnout (Table 3).

Missing value analysis is performed to evaluate missing values in the database. Majority of variables have percent of missing values less than 1%, but variables Passed exams has 24 missings (4.8%), Mean grade 32 (6.5%), MBIPAsum as well as MBIPAlow 39 (7.9%), Physical activity 23 (4.6%), Field work 42 (8.5%) and Contact with animal owners 25 (5.0%). These missing values are assumed to be missing at random.

Multiple regression analysis revealed an independent dose-response effect of perceived stress at exams on the onset of burnout (moderate stress OR = 2.164 and high stress OR = 3.878). Also, students with the moderate and high stressful effects of communication with teaching staff, as well as, those with worse self-perceived physical and mental health had more than two times higher presence of burnout (Table 4).

The model reveals that all predictors except gender are significant to predict burnout outcome. Health worsening (physical and mental) significantly favors burnout outcome. Stress-

Table 1. MBI subscale scores and burnout prevalence by student gender and year of study.

Variables	Emotional exhaustion (EE)		Depersonalization (DP)		Personal accomplishment (PA)		Burnout n (%)
	Mean±SD	high EE score n (%)	Mean ±SD	high DP score n (%)	Mean ±SD	low PA score n (%)	
All (n = 496)	25.60 ±11.61	223 (45.0)	15.40 ±6.56	394 (79.4)	32.18 ±8.50	271 (50.5)	215 (43.3)
Gender							
Male (n = 329)	24.67 ±11.74	141 (42.9)	15.33 ±6.57	262 (79.6)	32.65 ±8.74	151 (49.0)	136 (41.3)
Female (n = 167)	27.44 ±11.16	82 (49.1)	15.56 ±6.56	132 (79.0)	31.21 ±7.94	80 (53.7)	79 (47.3)
p value	0.012 ^a	0.186 ^b	0.710 ^a	0.877 ^b	0.090 ^a	0.350 ^b	0.205 ^b
Year of study (n)							
I (124)	24.33 ±11.37	50 (40.3)	15.64 ±6.44	104 (83.9)	33.70 ±8.01	46 (41.1)	50 (40.3)
II (108)	26.12 ±11.24	52 (48.1)	15.81 ±6.69	84 (77.8)	29.58 ±9.14	66 (65.3)	51 (47.2)
III (83)	27.53 ±11.819	41 (49.4)	15.73 ±7.10	67 (80.7)	32.21 ±9.09	37 (48.7)	38 (45.8)
IV (66)	24.80 ±11.96	29 (43.9)	14.09 ±6.37	47 (71.2)	32.97 ±7.26	31 (50.8)	26 (39.4)
V (115)	25.57 ±11.84	51 (44.3)	15.29 ±6.27	92 (80.0)	32.59 ±8.21	51 (47.7)	50 (43.5)
p value	0.367 ^c	0.720 ^d	0.486 ^c	0.325 ^d	0.008 ^c	0.986 ^d	0.952 ^d

SD standard deviation; Burnout if high in EE ≥ 27 and DP ≥ 10

Post Hoc Test—mean grades: I vs. III p = 0.034; II vs. IV p = 0.007; III vs. IV p = 0.002; IV vs. V p = 0.029

^aIndependent Samples T test

^bPearson Chi-Square

^cANOVA

^dChi-Square test for trend (Cochran Armitage test)

<https://doi.org/10.1371/journal.pone.0230685.t001>

related to examination and communication with teaching staff category gradation correlates with higher odds for burnout outcome. Stressful effect of fieldwork has a nearly significant relationship (p = 0.062), but only category “mild” vs. no stress at all.

The presented model has explained variability 28.1% (Nagelkerke R square = 0.281) and the model is calibrated (Hosmer and Lemeshow test p = 0.878). Based on the area under the curve, the model has good discriminative power (c = 0.77195%; CI 0.728–0.815; p < 0.001).

Discussion

This study investigated the prevalence of burnout and predictors contributing to its experience among Belgrade veterinary students. Our results indicated that 43.3% of participants met the criteria for burnout; this prevalence is higher compared to a recent study among Australian veterinary students [16] where a high risk of burnout was found among 30% of them. A study among UK veterinary students [17] showed that 58% of the respondents reported low self-esteem and/or depression, which may be the predictors for burnout. They also had poorer wellbeing and a higher degree of mental distress in comparison to the general population [17]. The survey conducted among 289 students of the College of Veterinary Medicine in Tennessee, showed much more common symptoms of depression and stress than in the general

Table 2. Academic achievement, health behavior and self-assessed health status with regard to burnout among Belgrade veterinary students.

Variables	Burnout		p value
	No	Yes	
Passed exams	21.88±14.21	22.17±14.01	0.809 ^a
Mean grade	8.07±0.66	8.06±0.74	0.811 ^b
Mental health compared to pre-study period, n (%)			<0.001 ^c
No change	150 (73.9)	53 (26.1)	
Better	38 (69.1)	17 (30.9)	
Worse	91 (38.6)	145 (61.4)	
Physical health compared to pre-study period, n (%)			<0.001 ^c
No change	172 (69.4)	76 (30.6)	
Better	22 (75.9)	7 (24.1)	
Worse	84 (38.9)	132 (61.1)	
Smokers, n (%)			0.013 ^c
No	206 (60.1)	137 (39.9)	
Yes	71 (48.0)	77 (52.0)	
Physical activity, n (%)			0.785 ^c
No	119 (56.9)	90 (43.1)	
Yes	147 (55.7)	117 (44.3)	
Alcohol consumption, n (%)			0.104 ^c
No	141 (60.5)	92 (39.5)	
Yes	139 (53.3)	122 (46.7)	

^aMann-Whitney U test^bT test^c χ^2 test

<https://doi.org/10.1371/journal.pone.0230685.t002>

population [21]. Another US study conducted among first-year veterinary students of Kansas State University College, reported high levels of depression and anxiety, with significant predictors such as poor physical health, difficulty fitting in among colleagues and high academic expectations [33]. These findings are congruent with our results showing that burnout and poor subjectively estimated physical health may be expected in every second veterinary student.

Many studies have confirmed that females are more susceptible to stress and burnout compared to males [21,34,35]. The results of our study showed that there is no significant impact of gender on the prevalence of burnout, although females more frequently reported higher levels of EE compared to male students. The study conducted in California found that living arrangements, specifically whether a student lived on his/her own was associated with burnout, which suggests that veterinary students may benefit from being a part of a support system whether in a community or at the university [15]. Perhaps the causes of stress should be sought more in the course of their studies. This means that students should better connect with colleagues, mentors and support staff to overcome homesickness. By sponsoring sports events aimed at improving physical health, it would also have a positive effect on students' mental functioning. By providing adequate resources for problem-solving and developing collective empathy, the prejudices associated with seeking help for mental health would be overcome [33].

In our study, the highest mean value of the EE scale was observed in the third year of study when the curriculum is the most comprehensive and when clinical subjects begin. In most

Table 3. Perceived stressful influence of study activities with regard to burnout among Belgrade veterinary students.

Perceived stress	Burnout (No)	Burnout (Yes)	p value ^a
Exams, n (%)			<0.001
Absent	17 (85.0)	3 (15.0)	
Mild	45 (84.9)	8 (15.1)	
Moderate	123 (63.7)	70 (36.3)	
High	93 (41.2)	133 (58.8)	
Colloquiums, n (%)			<0.001
Absent	78 (78.8)	21 (21.2)	
Mild	112 (58.6)	79 (41.4)	
Moderate	70 (43.5)	91 (56.5)	
High	17 (44.7)	21 (55.3)	
Communication with the teaching staff, n (%)			<0.001
Absent	141 (73.1)	52 (26.9)	
Mild	89 (53.3)	78 (46.7)	
Moderate	33 (37.19)	56 (62.9)	
High	14 (33.3)	28 (66.7)	
Field work, n (%)			<0.001
Absent	180 (62.3)	109 (37.7)	
Mild	56 (48.3)	60 (51.7)	
Moderate	13 (48.1)	14 (51.9)	
High	9 (40.9)	13 (59.1)	
Contact with pet owners, n (%)			<0.001
Absent	186 (63.1)	109 (36.9)	
Mild	55 (50.5)	54 (49.5)	
Moderate	21 (39.6)	32 (60.4)	
High	5 (35.7)	9 (64.3)	

^aTrend = Mantel–Haenszel chi square test for trend

<https://doi.org/10.1371/journal.pone.0230685.t003>

veterinary programs, students of the first year do not start clinical rotations and are not exposed to stressors related to clinical work, such as dissatisfied clients, death of pets or diagnostic errors [36]. Adequate mechanisms are needed to help veterinary students to cope with the stress that is more intense and cumulative in higher studies, especially in the third year, which is most stressful given the greater clinical responsibility that students assume, the possible subsequent diagnostic errors, and the death of the patients they encounter [36]. Veterinary students experience psychological and physiological changes during their education due to perceived poor physical health, unclear expectations, difficulties in fitting in and heavy workload. The highest anxiety and depression among US students were found in their second and third year of studying [7]. In our research, the percentage of students with burnout was the highest among sophomores.

Our result of poorer self-estimated physical and mental health in the group of students with burnout compared to the group without burnout has been confirmed as well as in the other studies like a predictor of anxiety and depression in veterinary students [7,33].

Health-related habits such as exercise could play important roles in the mediation between psychological distress and coping styles influencing mental health [37]. Reduced physical activity could be associated with stress among university students [38]. Our results showed no statistically significant differences in physical activity between the students with burnout and without it. Maybe the explanation is in the extremely heavy workload which does not leave

Table 4. Multiple regression model with the presence of burnout as a dependent variable and perceived stress of academic activities as independent factors.

Variables	OR (95% CI)	p value
Stressful effect of exam		
No	1	0.002
Mild	0.894 (0.182–4.400)	0.890
Moderate	2.164 (0.527–8.884)	0.284
High	3.878 (0.944–15.923)	0.060
Stressful effect of communication with teaching staff		
No	1	0.014
Mild	1.724 (1.028–2.892)	0.039
Moderate	2.531 (1.339–4.785)	0.004
High	2.690 (1.126–6.427)	0.026
Stressful effect of field work		
No	1	0.208
Mild	1.638 (0.976–2.751)	0.062
Moderate	1.875 (0.732–4.804)	0.190
High	1.045 (0.375–2.914)	0.932
Estimated physical health		
No change	1	0.003
Better	0.675 (0.252–1.809)	0.434
Worse	2.110 (1.324–3.364)	0.002
Estimated mental health		
No change	1	0.005
Better	1.507 (0.688–3.304)	0.306
Worse	2.307 (1.390–3.830)	0.001
Gender (female)	0.708 (0.444–1.129)	0.147

<https://doi.org/10.1371/journal.pone.0230685.t004>

students enough free time for physical activity beside rest and sleep [39]. In accordance with the latest recommendations of the Center for Disease Control on the benefits of physical activity for psychological health, it is certainly necessary to encourage students to exercise on a regular basis in order to overcome stress and improve their health [39].

Regarding other aspects of health habits, smoking was more frequent among students with burnout compared to students without it ($p = 0.013$). Our results on healthy habits support the findings of similar studies indicating the connection between smoking and alcohol consumption with stress [31], but more detailed research to determine this connection is needed. The explanation of this link could be found in the fact that healthcare practitioners are often exposed to a burden of duties and responsibilities at work and use tobacco and alcohol as legal ways of relaxing [40].

There are evidence that major predictors of academic burnout are: the absence of free time, fear of failure, lack of help and support, uncertain future, big pressure due to exams, bad financial situation as well as stressful contacts with patients [41]. Research among medical students showed that stress related to exams, but not to colloquiums and other teaching activities was an important predictor of burnout [42–44]. In our study, both exams, colloquiums, communications with teaching staff and contacts with pet owners were stressful for veterinary students. Finally, the perceived stress at the exams remained as an independent correlate of students' burnout in a multivariate analysis.

The study conducted in Australia determined that students of veterinary medicine also seem to suffer from high levels of anxiety and stress and have inadequate strategies for coping

with adversity [25]. Modifying the curriculum at the Faculty of Veterinary Medicine, which includes lectures on skills for overcoming stress and stressful situations, may enable future veterinarians to improve their skills in the workplace and their mental health, which would contribute to a higher satisfaction at their workplace. The integration of communication and coping skills and leadership, within education in the curricula of veterinary schools may improve the present situation [45,46]. On-line learning resources [47] together with online tutoring support [48] can incorporate student-centered learning in basic subjects which can help students to overcome stress. Communication skills can also be effectively taught in experiential learning, discussions, and feedback through role-play in small groups of students using simulated clients and trained facilitators [49].

To the best of our knowledge, this is the first study on burnout and its correlates among veterinary students in Serbia. A variety of different academic and non-academic stressors, such as heavy workload, fitting in with peers, rigorous academic requirements, home sickness, relationship difficulties, and financial strains are common to university students. Thus, the results of our research may be generalized to veterinary students worldwide. However, several limitations should be mentioned. First, the use of cross-sectional design does not allow a causal relationship to be determined among variables. Second, the information on all variables had been self-reported and may have been subject to recall bias. Third, a limitation of the study may be the selection bias because students affected by burnout may be more willing to participate as suggested by other burnout scales not used in our study. Fourth, burnout in the workplace may be also related to administrative policy/procedure that was not measured in our study. Fifth, Serbian students and their families due to a turbulent recent history of heavy economic crisis and war may have improved their resilience to stress compared to the veterinary students from other European regions. Furthermore, resilience, grit and other measures of improved mental wellbeing were not explored in this study, nor the concept of comparing highly and poorly resilient people and their predisposition (or not) to burnout.

Conclusion

Notwithstanding all previously mentioned limitations, our study shows that the prevalence of burnout among Belgrade veterinary students is relatively high. In univariate analysis the main correlates of students' burnout are female gender, smoking, poor subjectively estimated physical and mental health and perceived stress from academic activities. In a multiple regression analysis, the independent dose-response effect on the onset of burnout remained only for perceived stress at the exams.

The study results indicate that it is possible to determine proneness to burnout among veterinary students. There are some future considerations concerning curriculum adjustment or a different time planning of colloquiums that can leave more time to relax and lower the risk of burnout. The introduction of peer support and culture of acceptance and hospitality may be helpful for students' better adjustment.

Author Contributions

Conceptualization: Jelena Ilić Živojinović, Dušan Backović.

Data curation: Jelena Ilić Živojinović, Olivera Valčić, Janko Janković.

Formal analysis: Ivan Soldatović.

Funding acquisition: Goran Belojević.

Methodology: Jelena Ilić Živojinović, Dušan Backović.

Supervision: Dušan Backović, Goran Belojević.

Writing – original draft: Jelena Ilić Živojinović, Dušan Backović.

Writing – review & editing: Goran Belojević, Olivera Valčić, Ivan Soldatović, Janko Janković.

References

1. Guthrie E, Black D, Bagalkote H, Shaw C, Campbell M, Creed F. Psychological stress and burnout in medical students: a five-year prospective longitudinal study. *JRSM open*. 1998; 91: 237–243.
2. Braveman P, Gottlieb L. The Social Determinants of Health: It's Time to Consider the Causes of the Causes. *Public Health Reports*. 2014; 129: 9–31.
3. Seeman T, Epel E, Gruenewald T, Karlamangla A, McEwen BS. Socio-economic differentials in peripheral biology: cumulative allostatic load. *Ann N Y Acad Sci*. 2010; 1186: 223–239. <https://doi.org/10.1111/j.1749-6632.2009.05341.x> PMID: 20201875
4. Stevenson A, Harper S. Workplace stress and the student learning experience. *Quality Assurance in Education*. 2006; 14: 167–178.
5. Pickles KJ, Rhind SM, Miller R, Jackson S, Allister R, Philp J, et al. Potential barriers to veterinary student access to counselling and other support systems: perceptions of staff and students at a UK veterinary school. *Vet Rec*. 2012; 170: 124. <https://doi.org/10.1136/vr.100179> PMID: 22186377
6. Reisbig AM, Danielson JA, Wu TF, Hafen M Jr, Krienert A, Girard D, et al. A study of depression and anxiety, general health, and academic performance in three cohorts of veterinary medical students across the first three semesters of veterinary school. *J Vet Med Educ*. 2012; 39: 341–358. <https://doi.org/10.3138/jvme.0712-065R> PMID: 23187027
7. Siqueira Drake AA, Hafen M Jr, Rush BR, Reisbig AM. Predictors of anxiety and depression in veterinary medicine students: a four-year cohort examination. *J Vet Med Educ*. 2012; 39: 322–330. <https://doi.org/10.3138/jvme.0112-006R> PMID: 23187025
8. Diulio AR, Dutta NM, Gauthier JM, Witte TK, Correia CJ, Angarano D. Associations among depressive symptoms, drinking motives, and risk for alcohol-related problems in veterinary students. *J Vet Med Educ*. 2015; 42: 11–17. <https://doi.org/10.3138/jvme.0914-093R> PMID: 25547905
9. Hafen M Jr, Reisbig AM, White MB, Rush BR. The first-year veterinary student and mental health: the role of common stressors. *J Vet Med Educ*. 2008; 35: 102–109. <https://doi.org/10.3138/jvme.35.1.102> PMID: 18339964
10. Gregory KP, Matthew SM, Baguley JA. Analysis of the costs of veterinary education and factors associated with financial stress among veterinary students in Australia. *Aust Vet J*. 2018; 96: 11–16. <https://doi.org/10.1111/avj.12655> PMID: 29231249
11. Backovic D, Jevtic M. Burnout syndrome as a mental health problem among medical students. *Med Pregl*. 2012; 65: 129–132. <https://doi.org/10.2298/mpns1204129b> PMID: 22788061
12. Hansez I, Schins F, Rollin F. Occupational stress, work-home interference and burnout among Belgian veterinary practitioners. *Ir Vet J*. 2008; 61: 233–241. <https://doi.org/10.1186/2046-0481-61-4-233> PMID: 21851711
13. Hatch PH, Winefield HR, Christie BA, Lievaart JJ. Workplace stress, mental health, and burnout of veterinarians in Australia. *Aust Vet J*. 2011; 89: 460–468. <https://doi.org/10.1111/j.1751-0813.2011.00833.x> PMID: 22008127
14. Elkins AD, Kearney M. Professional burnout among female veterinarians in the United States. *J Am Vet Med Assoc*. 1992; 200: 604–608. PMID: 1568895
15. Chigerwe M, Boudreaux KA, Ilkiw JE. Assessment of burnout in veterinary medical students using the Maslach Burnout Inventory-Educational Survey: a survey during two semesters. *BMC Med Educ*. 2014; 14: 255. <https://doi.org/10.1186/s12909-014-0255-4> PMID: 25429983
16. McArthur ML, Andrews JR, Brand C, Hazel SJ. The Prevalence of Compassion Fatigue among Veterinary Students in Australia and the Associated Psychological Factors. *J Vet Med Educ*. 2017; 44: 9–21. <https://doi.org/10.3138/jvme.0116-016R3> PMID: 28206848
17. Cardwell JM, Lewis EG, Smith KC, Holt ER, Baillie S, Allister R, et al. A cross-sectional study of mental health in UK veterinary undergraduates. *Vet Rec*. 2013; 173: 266–266. <https://doi.org/10.1136/vr.101390> PMID: 23956162
18. Maslach C, Leiter MP. Understanding the burnout experience: recent research and its implications for psychiatry. *World Psychiatry*. 2016; 15: 103–111. <https://doi.org/10.1002/wps.20311> PMID: 27265691

19. Ludwig AB, Burton W, Weingarten J, Milan F, Myers DC, Kligler B. Depression and stress amongst undergraduate medical students. *BMC Med Educ*. 2015; 15:141. <https://doi.org/10.1186/s12909-015-0425-z> PMID: 26311538
20. Pacheco JP, Giacomini HT, Tam WW, Ribeiro TB, Arab C, Bezerra IM et al. Mental health problems among medical students in Brazil: a systematic review and meta-analysis. *Rev Bras Psiquiatr*. 2017; 39: 369–378. <https://doi.org/10.1590/1516-4446-2017-2223> PMID: 28876408
21. Gelberg S, Gelberg H. Stress management interventions for veterinary students. *J Vet Med Educ*. 2005; 32: 173–181. <https://doi.org/10.3138/jvme.32.2.173> PMID: 16078169
22. Pelzer JM, Hodgson JL, Were SR. Veterinary students' perceptions of their learning environment as measured by the Dundee Ready Education Environment Measure. *BMC Res Notes*. 2014; 7: 170. <https://doi.org/10.1186/1756-0500-7-170> PMID: 24661621
23. Fernandes TH. European veterinary education: a bridge to quality. *Vet J*. 2005; 169: 210–215. <https://doi.org/10.1016/j.tvjl.2004.09.001> PMID: 15727912
24. Sutton RC. Veterinary students and their reported academic and personal experiences during the first year of veterinary school. *J Vet Med Educ*. 2007; 34: 645–651. <https://doi.org/10.3138/jvme.34.5.645> PMID: 18326777
25. Williams SM, Arnold PK, Mills JN. Coping with stress: a survey of Murdoch University veterinary students. *J Vet Med Educ*. 2005; 32: 201–212. <https://doi.org/10.3138/jvme.32.2.201> PMID: 16078172
26. Bullock G, Kraft L, Amsden K, Gore W, Prengle B, Wimsatt J, et al. The prevalence and effect of burnout on graduate healthcare students. *Can Med Educ J*. 2017; 8: e90–e108.
27. Campos JA, Jordani PC, Zucoloto ML, Bonafé FS, Maroco J. Burnout syndrome among dental students. *Rev Bras Epidemiol*. 2012; 15: 155–165. <https://doi.org/10.1590/s1415-790x2012000100014> PMID: 22450501
28. Matejić B, Milenović M, Kisić Tepavčević D, Simić D, Pekmezović T, Worley JA. Psychometric Properties of the Serbian Version of the Maslach Burnout Inventory-Human Services Survey: A Validation Study among Anesthesiologists from Belgrade Teaching Hospitals. *Scientific World Journal*. 2015; 2015:903597. <https://doi.org/10.1155/2015/903597> PMID: 26090517
29. Maslach C, Jackson SE, Leiter MP. *The Maslach Burnout Inventory* (3rd Ed). Palo Alto, CA: Consulting Psychologists Press; 1996.
30. West CP, Dyrbye LN, Sloan JA, Shanafelt TD. Single-item measures of emotional exhaustion and depersonalization are useful for assessing burnout in medical professionals. *J Gen Intern Med*. 2009; 24: 1318–1321. <https://doi.org/10.1007/s11606-009-1129-z> PMID: 19802645
31. Cecil J, McHale C, Hart J, Laidlaw A. Behaviour and burnout in medical students. *Med Educ Online*. 2014; 19:25209. <https://doi.org/10.3402/meo.v19.25209> PMID: 25160716
32. Heinze G, Wallisch C, Dunkler D. Variable selection—A review and recommendations for the practicing statistician. *Biom J*. 2018; 60: 431–449. <https://doi.org/10.1002/bimj.201700067> PMID: 29292533
33. Hafen M Jr, Reisbig AM, White MB, Rush BR. Predictors of depression and anxiety in first-year veterinary students: a preliminary report. *J Vet Med Educ*. 2006; 33: 432–440. <https://doi.org/10.3138/jvme.33.3.432> PMID: 17035221
34. Mastenbroek NJ, Jaarsma AD, Demerouti E, Muijtjens AM, Scherpbier AJ, van Beukelen P. Burnout and engagement, and its predictors in young veterinary professionals: the influence of gender. *Vet Rec*. 2014; 174:144. <https://doi.org/10.1136/vr.101762> PMID: 24306199
35. Backovic DV, Ilic Zivojinovic J, Maksimovic J, Maksimovic M. Gender differences in academic stress and burnout among medical students in final years of education. *Psychiatr Danub*. 2012; 24: 175–181. PMID: 22706416
36. Killinger SL, Flanagan S, Castine E, Howard KA. Stress and Depression among Veterinary Medical Students. *J Vet Med Educ*. 2017; 44: 3–8. <https://doi.org/10.3138/jvme.0116-018R1> PMID: 28206849
37. Tada A. The Associations among Psychological Distress, Coping Style, and Health Habits in Japanese Nursing Students: A Cross-Sectional Study. *Int J Environ Res Public Health*. 2017; 14:1434.
38. Nguyen-Michel ST, Unger JB, Hamilton J, Spruijt-Metz D. Associations between physical activity and perceived stress/ hassles in college students. *Stress Health*. 2006; 22: 179–188.
39. Royal KD, Hunt SA, Gonzales Lm, Lewbart GA, Bailey KM. Veterinary Medical Students' Motivations for Exercise. *J Vet Med Educ*. 2018; 18: 1–7.
40. Fernandes LS, Nitsche MJT, Godoy I. Association between burnout syndrome, harmful use of alcohol and smoking in nursing in the ICU of a university hospital. *Cien Saude Colet*. 2018; 23: 203–214. <https://doi.org/10.1590/1413-81232018231.05612015> PMID: 29267824

41. Muzafar Y, Khan HH, Ashraf H, Hussain W, Sajid H, Tahir M, et al. Burnout and its Associated Factors in Medical Students of Lahore, Pakistan. *Cureus*. 2015; 7:e390. <https://doi.org/10.7759/cureus.390> PMID: [26719833](https://pubmed.ncbi.nlm.nih.gov/26719833/)
42. Stewart SM, Betson C, Marshall I, Wong CM, Lee PWH, Lam TH. Stress and vulnerability in medical students. *Med Educ*. 1995; 29: 119–127.
43. Ko SM, Kua EH, Fones CS. Stress and the undergraduates. *Singapore Med J*. 1999; 40: 627–630. PMID: [10741189](https://pubmed.ncbi.nlm.nih.gov/10741189/)
44. Galán F, Sanmartín A, Polo J, Giner L. Burnout risk in medical students in Spain using the Maslach Burnout Inventory-Student Survey. *Int Arch Occup Environ Health*. 2011; 84: 453–459. <https://doi.org/10.1007/s00420-011-0623-x> PMID: [21373879](https://pubmed.ncbi.nlm.nih.gov/21373879/)
45. Hatch PH, Winefield HR, Christie BA, Lievaart JJ. Workplace stress, mental health, and burnout of veterinarians in Australia. *Aust Vet J*. 2011; 89: 460–468. <https://doi.org/10.1111/j.1751-0813.2011.00833.x> PMID: [22008127](https://pubmed.ncbi.nlm.nih.gov/22008127/)
46. Henry C, Treanor L. Entrepreneurship education and veterinary medicine: enhancing employable skills. *Education & Training*. 2010; 52: 607–623.
47. Dooley LM, Frankland S, Boller E, Tudor E. Implementing the Flipped Classroom in a Veterinary Pre-clinical Science Course: Student Engagement, Performance, and Satisfaction. *J Vet Med Educ*. 2018; 2: 1–9.
48. García-Iglesias MJ, Pérez-Martínez C, Gutiérrez-Martín CB, Díez-Laiz R, Sahagún-Prieto AM. Mixed-method tutoring support improves learning outcomes of veterinary students in basic subjects. *BMC Vet Res*. 2018; 14: 35. <https://doi.org/10.1186/s12917-018-1330-6> PMID: [29390998](https://pubmed.ncbi.nlm.nih.gov/29390998/)
49. Berkhof M, van Rijssen HJ, Schellart AJ, Anema JR, van der Beek AJ. Effective training strategies for teaching communication skill to physicians: an overview of systematic reviews. *Patient Educ Couns*. 2011; 84: 152–162. <https://doi.org/10.1016/j.pec.2010.06.010> PMID: [20673620](https://pubmed.ncbi.nlm.nih.gov/20673620/)