



## The prevalence and socioeconomic correlates of depressive and anxiety symptoms in a group of 1,940 Serbian university students

Prevalencija i uticaj socioekonomskih faktora na nastanak depresivnosti i anksioznosti na uzorku od 1 940 studenata u Srbiji

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### Abstract

**Background/Aim.** Mental health of university students is under increasing concern worldwide, because they face challenges which predisposes them to depression and anxiety. The aim of this study was to identify demographic and socioeconomic variables associated with depressive and anxiety symptoms among university students. **Methods.** This cross-sectional study on 1,940 university students was performed using a questionnaire including demographic and socioeconomic variables, Beck Depression Inventory and Beck Anxiety Inventory. **Results.** The prevalence of depressive symptoms in students was 23.6%, while the prevalence of anxiety symptoms was 33.5%. The depressive symptoms were significantly related to the study year ( $p = 0.002$ ), type of faculty ( $p = 0.014$ ), satisfaction with college major choice ( $p < 0.001$ ), satisfaction with grade point average ( $p < 0.001$ ). Female students (odds ratio – OR = 1.791, 95% confidence interval – CI = 1.351–2.374), older students (OR = 1.110, 95% CI = 1.051–1.172), students who reported low family economic situation (OR = 2.091, 95%

CI = 1.383–3.162), not owning the room (OR = 1.512, 95% CI = 1.103–2.074), dissatisfaction with graduate education (OR = 1.537, 95% CI = 1.165–2.027) were more likely to show depressive symptoms. The anxiety symptoms were significantly related to study year ( $p = 0.034$ ), type of faculty ( $p < 0.001$ ), family economic situation ( $p = 0.011$ ), college residence ( $p = 0.001$ ) satisfaction with the college major choice ( $p = 0.001$ ), and satisfaction with graduate education ( $p < 0.001$ ). Female students (OR = 1.901, 95% CI = 1.490–2.425), and students who reported parents high expectations of academic success (OR = 1.290, 95% CI = 1.022–1.630) were more likely to show anxiety symptoms. **Conclusion.** This is one of the largest study examining mental disorders in a sample of university students in Serbia. These findings underscore the importance of early detections of mental problems and prevention interventions in university students.

**Key words:** depression; anxiety; students; signs and symptoms; prevalence; socioeconomic factors; serbia.

### Apstrakt

**Uvod/Cilj.** Mentalno zdravlje studenata postaje sve više sfera interesovanja na globalnom nivou, jer sučeljavanje sa brojnim životnim situacijama koje nosi ovaj period života ubrzava nastanak depresivnih i anksioznih poremećaja. **Metode.** Istraživanje je sprovedeno kao epidemiološka studija preseka na uzorku od 1 940 studenata, korišćenjem upitnika koji je pored demografskih i socioekonomskih karakteristika obuhvatao Bekovu skalu za procenu depresivnosti i Bekovu skalu za procenu anksioznosti. **Rezultati.** Na ispitivanom uzorku, prevalencija depresivnih simptoma iznosila je 23,6% a preva-

lencija anksioznih simptoma 33,5%. Utvrđeno je da postoji statistički značajna povezanost nastanka depresivnih simptoma sa godinom studija ( $p = 0,002$ ), vrstom fakulteta ( $p = 0,014$ ), zadovoljstvom izborom fakulteta ( $p < 0,001$ ) i zadovoljstvom prosečnom ocenom ( $p < 0,001$ ). Regresionom analizom dobijeno je da su ženski pol (OR = 1,791, 95% CI = 1,351–2,374), stariji uzrast (OR = 1,110, 95% CI = 1,051–1,172), loš imovni status porodice (OR = 2,091, 95% CI = 1,383–3,162), neposredovanje svoje sobe (OR = 1,512, 95% CI = 1,103–2,074), nezadovoljstvo uslovima studiranja (OR = 1,537, 95% CI = 1,165–2,027) pokazatelji nastanka depresivnih simptoma. U pogledu anksioznih simptoma, utvrđena

je statistički značajna povezanost sa godinom studija ( $p = 0,034$ ), vrstom fakulteta ( $p < 0,001$ ), mestom stanovanja za vreme studiranja ( $p = 0,001$ ), porodičnim imovnim statusom ( $p = 0,011$ ), zadovoljstvom izbora fakulteta ( $p = 0,001$ ) i zadovoljstvom uslovima studiranja ( $p < 0,001$ ). Regresionom analizom dobijeno je da su ženski pol (OR = 1,901, 95% CI = 1,490–2,425) i visoka očekivanja roditelja uspeha na studijama (OR = 1,290, 95% CI = 1,022–1,630) prediktori nastanka anksioznih simptoma. **Zaključak.** Studija predstavlja jed-

no od najvećih istraživanja koje se bavi procenom mentalnog zdravlja populacije studenata na teritoriji Srbije. Dobijeni rezultati ukazuju na značaj ranog prepoznavanja problema iz oblasti mentalnog zdravlja u cilju pripreme preventivnih programa.

**Ključne reči:**  
**depresija; anksioznost; studenti; znaci i simptomi; prevalenca; socioekonomski faktori; srbija.**

## Introduction

Mental health problems are a major public health concern due to their high prevalence rates, difficult treatment, and often chronic course<sup>1</sup>. In addition, the unrecognized burden of depression and anxiety became undeniably evident in developed and developing countries until the year 2000<sup>2</sup>. In the European region, mental disorders, including anxiety and depression, are the second largest contributor to the burden of disease (measured using disability-adjusted life years – DALYs) and the most important cause of disability<sup>3</sup>. By the year 2020, if current trends for demographic and epidemiological transition continue, burden of depression will become the second leading cause of DALYs lost<sup>4</sup>. Anxiety disorders also rank among the twenty conditions contributing the largest global share of years lived with disability (YLDs)<sup>5</sup>. Furthermore, most lifetime mental disorders have their first onset during the typical university age<sup>6,7</sup>, making depression a particularly salient problem area for student population<sup>8</sup>. Worldwide estimation of current depression prevalence range upwards from 8%<sup>9</sup> to as high as 85% among university students<sup>10</sup>. Regarding anxiety symptoms, the prevalence will range from 8%<sup>9</sup> to 47.7%<sup>10</sup>. Generally, the prevalence seems to be increasing. In the United States of America, the National College Health Assessment reported that 1 in 3 undergraduates had at least one episode in the previous year of “feeling so depressed it was difficult to function”<sup>7</sup>. With symptoms of nearly three-fourths of all lifetime diagnosable mental health disorders it is critical to identify these disorders as early in life as possible<sup>11</sup>.

Studies show that female students had almost two times higher level of depression compared to their male counterparts<sup>12</sup>. Socioeconomic parameters that are connected with the prevalence of depression are low incomes and financial problems (lower socioeconomic status), lower education level, bad living conditions and urban life style<sup>13</sup>. Higher anxiety level in female (aged 20–30 years) shows no differences regarding religion and socioeconomic status<sup>14</sup>. Other potential stressors for depression and anxiety can be: transition to university life, acclimating to a new environment, establishing new social networks, meeting their personal goals<sup>15</sup>, academic factors (year of study, area of study)<sup>16</sup>, academic overload and demands, financial pressures, pressure to succeed<sup>17</sup>, separation from their usual support network<sup>15,18</sup>. On the other hand, sometimes there is a high level of stigmatization associated with mental illness<sup>19</sup>. Previously obtained data in Serbia showed that about 1/3 of

high school and university students population manifested signs of psychological distress and has mental problems<sup>20</sup>. Moreover, mild depression was reported to be six times more prevalent than severe depression and it was more prevalent in the 20–24 age groups. This could be considered as a kind of maladaptive behavior<sup>21</sup>.

From the public health perspectives, early detection of mental health problems is essential, especially in young adults, in order to conduct appropriate screening and intervention programs<sup>22,23</sup> and to improve the longer-term prognosis related to future risk of depression<sup>24</sup>.

The general applicability of published results concerning student's mental health is limited. Most studies are based on samples that are not representative of the general student population, due to confinement to a single faculty, to the specified years of study to one academic field or are selected using non-probabilistic methods<sup>16</sup>. After considering all these factors, we planned to estimate the prevalence of depressive and anxiety symptoms and to examine the specific demographic, socioeconomic correlates of depressive and anxiety symptoms.

## Methods

### *Study design and participants*

The study was a cross-sectional survey of students attending University of Kragujevac, Serbia, in the year 2013/2014. University of Kragujevac, with its twelve faculties, is a state-owned university in Central Serbia. Six of its faculties are located in Kragujevac, while the other six faculties are located in five towns of Central Serbia, thus covering the area with more than 2,500,000 inhabitants. All the twelve faculties were selected for the survey: Faculty of Agronomy, Faculty of Economics, Faculty of Engineering, Faculty of Mechanical and Civil Engineering, Faculty of Medical Sciences, Faculty of Education, Faculty of Law, Faculty of Natural Sciences and Mathematics, Faculty of Technical Sciences, Teachers Training Faculty, Faculty of Philology and Arts, Faculty of Hotel Management and Tourism. The students were randomly sampled from every study year of each faculty, in proportion to the size of the faculty in relation to the total number of students in University. We randomly selected 1,940 students from the total of 18,123 students at the University of Kragujevac. The students were sorted out from the university students data base according to previously generated random order (random computer function).

### Procedure

A self administered anonymous questionnaire which comprised of demographic and socioeconomic variables, Beck Depression Inventory (BDI-IA) and Beck Anxiety Inventory (BAI) were used. Ethical approval was obtained from the Faculty of Medical Sciences Ethical Committee. Participation was completely voluntary, with no economic or other motivation. Informed consent was obtained, and confidentiality of the responses was assured. The study was conducted in the participants own classrooms by the leading researcher. Those who were absent during the distribution of questionnaires were excluded. The research was completed within 35 weeks.

### Instruments

A self-assessment questionnaire with detailed subdomain questions was used to determine variables. Symptoms of depression were evaluated through the scale BDI-IA. This scale was developed in the 1960's and is one of the most widely used instruments for measuring the severity of depression, with the focus on behavioral and cognitive aspects of these disorders<sup>25</sup>. It was designed to document a variety of depressive symptoms the individual experienced over the preceding week. It consists of 21 items, each answer being scored on a scale ranging from 0 to 3. The total score has a minimum of 0 and a maximum of 63. The rating scale was as follows: 0 to 9 – no symptoms, 10 to 15 – mild mood change or mild depression state; 16 to 19 – mild to moderate depression, 20 to 29 – moderate depression and 30 to 63 – severe or clinical depression. The internal consistency for the BDI-IA was good, with average alpha coefficient of 0.81 for non psychiatric samples and with highly intercorrelated items<sup>26</sup>.

Symptoms of anxiety were evaluated through the BAI scale, a short list describing 21 anxiety symptoms which bothered them in the past week. The scale consists of 21 items, each answer being scored on a scale ranging from 0 to 3. The total score has a minimum of 0 and a maximum of 63. A total score of 0 to 7 is interpreted as a “minimal” level of anxiety, 8 to 15 as a “mild” level of anxiety, 16 to 25 as a “moderate” level of anxiety, and 26 to 63 as a “severe” level of anxiety<sup>27</sup>.

### Statistical analysis and assessment

Data analysis was carried out using IBM Statistical Package for the Social Sciences (SPSS) software version 19.0. Data cleaning was done to detect any missing values, coding error or any illogical data values. The qualitative variables (demographic and socioeconomic) were presented with the numbers and as a percentage. The continuous variables (depression, anxiety and symptoms scores), were presented as means and standard deviation (SD). Descriptive statistics for all sociodemographic characteristics, depressive and anxiety symptoms of the participants were calculated, expressed as appropriately in frequencies, mean values and standard deviation. Student's *t*-test, Fisher's exact test  $\chi^2$  Pearson and Spearman correlations were all used to look for any existing association between demographic and socioeconomic cha-

acteristics, and anxiety and depression. All tests were 2-tailed, and the level of significance was set at  $p < 0.05$ . We conducted univariate and multivariate logistic regression analysis to study associations between depressive, anxiety symptoms and potential risk factors. The results are reported as odds ratios (OR) with 95% confidence intervals (CI).

### Results

From 1,968 distributed questionnaires, a total of 1,940 students completed questionnaire during the survey with the response rate of 98.6%. The mean age of the participating students was 21.04 (SD =  $\pm 2.23$ ) years with the range of 18–57 years. The demographic and socioeconomic characteristics of the sample are summarized in Table 1.

Regarding depressive symptoms, the mean BDI-IA score was 6.12 (SD =  $\pm 6.4$ ), with the range between 0 and 63. Further analysis indicated that 15.4% of the students had the score between 10 and 15 (mild depression state), 4.2% the score between 16 and 19 mild to moderate depression), 2.9% the score between 20 and 29 (moderate depression), 1.1% the score between 30 and 63 (severe depression). The mean BAI score for anxiety symptoms was 6.88 (SD =  $\pm 7.3$ ), with the range between 0 and 63. About 22.7% of the respondents had a score between 8 and 15 (mild anxiety), 7.4% the score between 16 and 25 (moderate anxiety), 3.4% the score between 26 and 63 (severe anxiety).

The depressive symptoms were significantly related to the study year ( $p = 0.002$ ), the type of faculty ( $p = 0.014$ ), satisfaction with the college major choice ( $p < 0.001$ ), and satisfaction with grade point average ( $p < 0.001$ ).

We found no significant association of depressive symptoms with father's educational level ( $p = 0.815$ ), father's employment ( $p = 0.669$ ), mother's educational level ( $p = 0.969$ ), mother's employment, ( $p = 0.393$ ), residence ( $p = 0.928$ ) marital status, ( $p = 0.510$ ) having children, ( $p = 0.825$ ), college residence ( $p = 0.097$ ), parent's high expectations of academic success ( $p = 0.069$ ) and professors high expectations of academic success ( $p = 0.158$ ). Association of depressive symptoms with potential risk factors is summarized in Table 2.

Analyses of logistic regression model indicated that the possibility of having depressive symptoms was significantly higher in students who were female (OR = 1.791; 95% CI, 1.351–2.374) who were older (OR = 1.110; 95% CI, 1.051–1.172), had a low family economic situation (OR = 2.091; 95% CI, 1.383–3.162), had dissatisfaction with graduate education (OR = 1.537; 95% CI, 1.165–2.027) and students who did not have their own room (OR = 1.512; 95% CI, 1.103–2.074). Logistic regression model on depressive symptoms is shown in Table 3.

The anxiety symptoms were significantly related to study year ( $p = 0.034$ ), type of faculty ( $p < 0.001$ ), family economic situation ( $p = 0.011$ ), college residence ( $p = 0.001$ ), satisfaction with the college major choice ( $p = 0.001$ ), and satisfaction with graduate education ( $p < 0.001$ ).

No statistically significant relationship was found between anxiety symptoms and age ( $p = 0.096$ ), father's

Table 1

Demographic and socioeconomic factors of the sample of university students (n = 1,940)		
Variable	n	(%)
Gender (total number)	1,931	
male	672	34.8
female	1,259	65.2
Age (year), $\bar{x} \pm SD$	21.04 $\pm$ 2.23	
Study year (total number)	1,931	
1	577	29.9
2	519	26.9
3	385	19.9
4	300	15.5
5	67	3.5
6	83	4.3
Father's educational level (total number)	1,875	
uneducated	8	0.4
primary school	111	5.9
high school	1,335	71.2
university	421	22.5
Father's employment, (total number)	1,853	
yes	1,213	65.5
no	640	34.5
Mother's educational level (total number)	1,903	
uneducated	5	0.2
primary school	158	8.3
high school	1,324	69.6
university	416	21.9
Mother's employment (total number)	1,893	
yes	1,055	55.7
no	838	44.3
Residence (total number)	1,925	
urban	1,067	55.4
semi-urban	379	19.7
rural	479	24.9
Marital status (total number)	1,922	
never married	1,872	97.3
married	42	2.2
separated	3	0.2
widowed	5	0.3
Having children (total number)	1,924	
yes	54	2.8
no	1,870	97.2
Owning the room (total number)	1,908	
yes	327	17.1
no	1,581	82.9
Family economic situation (total number)	(n = 1,916)	
very good	126	6.6
good	642	33.5
moderate	982	51.3
poor	145	7.6
very poor	21	1
College residence (total number)	(n = 1,841)	
campus	218	11.8
other	1,623	88.2
Satisfaction with college major choice (total number)	1,920	
very	613	31.9
mostly	1,118	58.2
not particular	154	8
not at all	35	1.9
Satisfaction with graduate education (total number)	1,910	
yes	1,306	68.4
no	604	31.6
Satisfaction with grade point average (total number)	1,710	
yes	976	57.1
no	734	42.9
Parents high expectations of academic success (total number)	1,910	
I completely agree	161	8.4
I agree	484	25.3
I don't know	311	16.3
I don't agree	697	36.5
I absolutely disagree	257	13.5
Professors high expectations of academic success (total number)	1,880	
I completely agree	124	6.6
I agree	322	17.1
I don't know	796	42.3
I don't agree	477	25.4
I absolutely disagree	161	8.6

Table 2

Variable	Depressive symptoms (% of patients)			$\chi^2$	DF	<i>p</i>
	none	mild	moderate & severe			
Gender						
male	82.0	10.9	7.1	17.71	2	< 0.001
female	73.4	17.8	8.7			
Age				25.138	2	< 0.001
Study year						
1	81.5	10.1	8.4	27.526	10	0.002
2	72.8	17.0	10.1			
3	75.4	18.0	6.6			
4	76.0	16.7	7.3			
5	77.4	11.3	11.3			
6	68.7	26.5	4.8			
Faculties				39.041	22	0.014
Owning the room						
yes	78.0	14.7	7.4	13.073	2	< 0.001
no	69.0	18.6	12.4			
Family economic situation						
very good	86.5	7.2	6.3	44.667	8	< 0.001
good	81.3	12.8	6.0			
moderate	74.8	16.1	9.1			
poor	59.8	26.5	13.6			
very poor	50.0	38.9	11.1			
Satisfaction with college major choice						
very	83.4	10.8	5.8	49.772	6	< 0.001
mostly	75.6	16.5	7.9			
not particular	59.3	24.3	16.4			
not at all	60.0	16.7	23.3			
Satisfaction with graduate education						
yes	80.8	12.6	6.6	38.257	4	< 0.001
no	67.3	21.5	11.1			
Satisfaction with grade point average						
yes	80.2	13.7	6.1	28.194	2	< 0.001
no	68.9	19.5	11.6			

DF – degrees of freedom.

Table 3

Logistic regression model on depressive symptoms					
Variables	B	<i>p</i>	OR	OR (95% CI)	
Gender	0.583	0.000	1.791	1.351	2.374
Age	0.104	0.000	1.110	1.051	1.172
Low family economic situation	0.738	0.000	2.091	1.383	3.162
Owning the room	0.414	0.010	1.512	1.103	2.074
Dissatisfaction with graduate education	0.430	0.002	1.537	1.165	2.027

OR – odds ratio; CI – confidence interval.

educational level ( $p = 0.371$ ), father's employment ( $p = 0.491$ ), mother's educational level ( $p = 0.564$ ), mother's employment ( $p = 0.933$ ), residence ( $p = 0.677$ ), marital status ( $p = 0.493$ ), having children ( $p = 0.398$ ), owning a room ( $p = 0.051$ ), satisfaction with grade point average ( $p = 0.196$ ), and professors high expectations of academic success ( $p = 0.113$ ). Association of anxiety symptoms with potential risk factors is summarized in Table 4.

The possibility of having anxiety symptoms was significantly higher in students who were female (OR = 1.901; 95% CI, 1.490–2.425); and had parents with high expectations about academic success (OR = 1.290; 95% CI, 1.022–1.630). Logistic regression model on anxiety symptoms is shown in Table 5.

## Discussion

The present study is one of the largest epidemiological studies, regarding mental health status among university students, in this region.

The primary objective of this study was to investigate the prevalence of depressive and anxiety symptoms in university students. We found that the prevalence of depressive symptoms was 23.6%, while the prevalence of anxiety symptoms was 33.5%. A significantly increased rate of depression in college students, previously reported from the U.S. and Western Europe studies, confirmed previous concerns about global growth<sup>28</sup>, especially which includes deficits in cognitive, emotional and physical development<sup>29</sup>. Although,

**Table 4**  
**Association of anxiety symptoms with potential risk factors**

Variable	Anxiety symptoms (% of patients)			$\chi^2$	DF	<i>p</i>
	none	mild	moderate & severe			
Gender						
male	76.6%	15.4%	8.0%	42.992	2	< 0.001
female	73.4%	17.8%	8.7%			
Study year						
1	71.6%	20.3%	8.1%	19.527	10	0.034
2	63.7%	24.4%	11.9%			
3	60.5%	24.6%	15.0%			
4	66.7%	22.2%	11.1%			
5	71.9%	19.3%	8.8%			
6	68.3%	25.6%	6.1%			
Faculties				53.365	22	< 0.001
Family economic situation						
very good	64.5%	20.6%	15.0%	19.799	8	0.011
good	70.2%	20.7%	9.1%			
moderate	65.0%	24.5%	10.5%			
poor	59.4%	24.2%	16.4%			
very poor	55.0%	15.0%	30.0%			
College residence						
campus	67.7%	21.3%	11.0%	13.637	2	0.001
other	56.4%	32.7%	10.9%			
Satisfaction with college major choice						
very	70.7%	20.7%	8.6%	22.43	6	0.001
mostly	66.0%	22.6%	11.4%			
not particular	53.2%	34.0%	12.8%			
not at all	60.0%	16.7%	23.3%			
Satisfaction with graduate education						
yes	69.3%	21.6%	9.1%	24.909	4	< 0.001
no	60.2%	25.3%	14.4%			
Parents high expectations of academic success						
I completely agree	56.1%	25.9%	18.0%	17.365	8	0.027
I agree	63.2%	24.3%	12.5%			
I don't know	65.4%	24.3%	10.4%			
I don't agree	70.5%	20.7%	8.7%			
I absolutely disagree	67.2%	22.1%	10.6%			

DF – degrees of freedom.

**Table 5****Logistic regression model on anxiety symptoms**

Variables	B	<i>p</i>	OR	OR (95% CI)	
Gender	0.642	0.000	1.901	1.490	2.425
Parents high expectations of academic success	0.255	0.032	1.290	1.022	1.630

OR – odds ratio.

our findings for the prevalence of depressive and anxiety symptoms are higher than the results of a large American study (17.3% and 9.8%, respectively) <sup>30</sup>, and Australian study (8% and 13% respectively) <sup>9</sup>, they are similar with some European studies, especially about the prevalence of depressive symptoms (23% in Germany, 27.1% in Turkey) <sup>18, 31</sup>. Interestingly, other European studies reported higher occurrence of depressive symptoms (34% in Poland, 39% in Bulgaria, 52.4% in Greece) <sup>15</sup>, while the lowest prevalence has been reported in the students in Switzerland (10.2%) <sup>32</sup>. All these variations could be explained by cultural differences, demographic and socioeconomic situation. One of the few studies from the former republics of Yugoslavia showed lower prevalence of depressive symptoms than our study

(Croatia 9.4% <sup>33</sup>, FYR Macedonia 10.4% <sup>34</sup>) but higher for anxiety symptoms (FYR Macedonia 65.5% <sup>34</sup>). It should, however, be noted that these discrepancies may be due to the small sample sizes. No closely related research studies, on the prevalence of depressive and anxiety symptoms, have been previously conducted among university students in Serbia, thus there are no data available for comparison.

The second objective of this study was to examine the demographic, socioeconomic correlates of depressive and anxiety symptoms, and the results are summarized in Tables 2 and 4. The present study reported statistically significant differences in depressive symptoms by gender, with a higher prevalence among female student. Using regression analysis we found that female students were 79.1% likely to get dep-

ressive symptoms, while 90.1% were more likely to suffer from anxiety symptoms, compared to male students. This is consistent with the majority of the studies regarding depressive symptoms<sup>15, 18, 30</sup>, while a number of studies have found either no differences<sup>6, 7, 31</sup> or the opposite pattern<sup>17</sup>. In addition, our results are consistent with higher rates of anxiety symptoms among females found by other researchers, although no significant association existed for depressive symptoms<sup>35, 36</sup>. One of the explanations may be because females are more likely to report concern, stress and feeling of lack of competence, different sociodemographic background or even including factors related to gender role and potentially stressful transforming events.

In our study depressive symptoms increased with increasing age, about 11% for every year of life. Tendencies showed significant increases from early adolescence, peaks in late adolescence (16–18 years) and decreases towards older ages<sup>18, 37</sup>. Potentially stressful events are presumed to elicit mental health problems, such as employment, economic situation, graduation and marriage pressures<sup>6, 30, 38</sup>. On the contrary, some other studies have failed to find this association<sup>39</sup>.

This study shows that students with lower socioeconomic background had a statistically significantly higher risk of depressive and anxiety symptoms. Using regression analysis, we also observed that students which reported low socioeconomic situation substantially have 109.1% the likelihood to develop depressive symptoms compared with those in the highest socioeconomic group. The inverse relationship between socioeconomic status and mental health problems is well established in general population samples<sup>6, 30, 35</sup>. Additionally, a meta-analysis in different European countries found unambiguous evidence that financial struggles had higher odds for depression<sup>18</sup> and anxiety, as well<sup>22</sup>.

Furthermore, our study concludes that there is a significant difference between the mean depression scores and not having own room, with a higher likelihood of depressive symptoms up to 51.2%. There were almost significant interactions regarding the student's anxiety symptoms. More than three persons per room are related to psychiatric illness<sup>40</sup> although some studies findings are contrary<sup>39</sup>. These findings might be correlated with sociological and culturological differences.

Another important aspect of our study, regarding subclinical depressive symptoms (usually corresponds to mild depressive episodes according to ICD-10 classification), revealed that it is high in such populations (15.4%). Studies from other countries show a wide variety of rates ranging between 10% and 44%<sup>6, 41–44</sup>. In our culture there is still no awareness that depression and anxiety are disorders of youth. Because of that, mild depression and anxiety sometimes are not diagnosed and treated by health professionals. This underlines the importance for establishing proper screening tools for early identification and treatment of subclinical forms of depression.

Some stressful life events like dissatisfaction with the college major choice and dissatisfaction with graduate education was significant associated with depressive and anxiety symptoms. Our study indicates that students who are dissatisfied with graduate education were 53.7% more likely to have depressive symptoms. Students exposed to heavy acade-

mic workloads, strong examination criteria and being overburdened with test schedule, contributed to many of unhealthy behaviors<sup>44, 45</sup> and were significantly associated with anxiety<sup>30</sup> and depressive symptoms<sup>6, 31</sup>.

Consequently, the present study also revealed association between low overall success in grade point average and depressive symptoms, but no significant association with anxiety symptoms. These coincidence have been reported by other authors<sup>46</sup>, while others failed to find this correlation<sup>37</sup>.

Another important aspect of our study is statistically significant correlations of pressure for success and depressive and anxiety symptoms especially when they are not able to meet the expectations of their parents. The observed association signifies that students were 29.0% more likely to have anxiety symptoms. Pressure to perform well academically, parental expectations and criticism is a strong predisposing factor for depression<sup>47</sup>. These findings suggest that relationship with parents have a substantial causal relation with the depressive and anxiety symptoms, especially during this delicate period in their life.

Consistent with findings from similar studies<sup>22, 31</sup> we also found a significant correlation between the study year and higher level of depressive and anxiety symptoms. In addition, we found that the sixth year students had the highest average BDI-IA scores, compared with the first year students. Next, the highest average BAI scores had the third year students, in regard to senior students. Senior students had higher depression scores compared with freshmen because postgraduate students worry about employment and future perspective and these stresses could be risk factors for depressive and anxiety symptoms<sup>6, 22, 37</sup>. The severity of the employment situation in Serbia, aggravates the employment pressure of college graduate. The Statistical Office of the Republic of Serbia published that the unemployment rate for youth aged 15–24 is reaching nearly 50%<sup>48</sup> and that situation might be potential risk factor for mental disorders. The prevalence of anxiety and depressive symptoms were significantly related to the type of faculty. We also found that the students who were studying Faculty of Mechanical and Civil Engineering had the highest depression score (38.4%). Regarding anxiety, Faculty of Education (54.8%), Faculty of Hotel Management and Tourism (54.8%), Teachers Training Faculty (48.6%), had higher anxiety scores. Students who were studying Faculty of Engineering had the lowest depression and anxiety scores (12% and 24.1% respectively). Several studies have been conducted with various and controversial results<sup>49–51</sup> due to methodological issues that limit interpretation, different measure instruments and different settings and cultures.

The primary limitation of the study is its cross-sectional design, which does not permit inferences about possible causal relations between the explanatory variables and disorders of interest. It was not possible to assess the test–retest reliability of BDI/BAI in this sample as the survey was anonymous. Another limitation was the self-reported nature of this study. Finally, our sample comprised a group of students in just one university of Serbia, which may limit generalization of the results through the other universities. According to the Strategy 2020 by the World

Health Organization<sup>52</sup> strengthening mental health promotion programmes is highly relevant.

### Conclusion

These results demonstrate that the high rates of depressive and anxiety symptoms among university students are related to academic, nonacademic and cultural backgrounds. The last several years have provided data that highlight a neglected public health problem in institutes of higher education. The importance of early identification, especially the minor signs of depression, could prevent or reduce its severity and chronicity. From a public health perspective, onset and

development of mental illness in students is a potentially critical area for intervention programs. A particular challenge is to promote the early diagnosis of depression by initiating community-based intervention programmes and to reduce the stigma of mood disorders. Such efforts hold substantial promise for the development of interventions that may have a positive impact on the health and well-being of college students.

### Conflict of interest

All the authors declare that they have no conflicts of interest.

### R E F E R E N C E S

- Melo-Carrillo A, Van Oudenbore L, Lopez-Avila A. Depressive symptoms among Mexican medical students: high prevalence and the effect of a group psychoeducation intervention. *J Affect Disord* 2012; 136(3): 1098–103.
- Murray CJ, Vos T, Lozano R, Naghavi M, Flaxman AD, Michaud C, et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012; 380(9859): 2197–223.
- Wittchen HU, Jacobi F, Rehm J, Gustavsson A, Svensson M, Jönsson B, et al. The size and burden of mental disorders and other disorders of the brain in Europe 2010. *Eur Neuropsychopharmacol* 2011; 21(9): 655–79.
- Sayers J. World Health Report 2001 - Mental Health: New Understanding, New Hope. *Bull World Health Organ* 2001; 79(11): 1085.
- Becker AE, Kleinman A. Mental Health and the Global Agenda. *N Engl J Med* 2013; 369(1): 66–73.
- Chen L, Wang L, Qiu XH, Yang XX, Qiao ZX, Yang YJ, et al. Depression among Chinese university students: prevalence and socio-demographic correlates. *PLoS One* 2013; 8(3): e58379.
- Sarokhani D, Delpisheb A, Veisani Y, Sarokhani MT, Manesh RE, Sayehmiri K. Prevalence of Depression among University Students: A Systematic Review and Meta-Analysis Study. *Depress Res Treat* 2013; 2013: 373857.
- Reavley N, Jorm AF. Prevention and early intervention to improve mental health in higher education students: a review. *Early Interv Psychiatry* 2010; 4(2): 132–42.
- Said D, Kypri K, Bowman J. Risk factors for mental disorder among university students in Australia: findings from a web-based cross-sectional survey. *Soc Psychiatry Psychiatr Epidemiol* 2013; 48(6): 935–44.
- Ibrahim AK, Kelly SJ, Adams CE, Glazebrook C. A systematic review of studies of depression prevalence in university students. *J Psychiatr Res* 2013; 47(3): 391–400.
- Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry* 2005; 62(6): 593–602.
- Warraich P, Goldner EM, Somers JM, Hsu L. Prevalence and incidence studies of mood disorders: a systematic review of the literature. *Can J Psychiatry* 2004; 49(2): 124–38.
- Singleton N, Bumpstead R, O'Brien M, Lee A, Meltzer H. Psychiatric morbidity among adults living in private households, 2000. *Int Rev Psychiatry* 2003; 15(1–2): 65–73.
- Adamović V, Erić Lj, Kaličanin P, Starčević V. *Psycho-Neuroses*. Belgrade: School of Medicine; 2000. (Serbian)
- Sokratous S, Merkouris A, Middleton N, Karanikola M. The association between stressful life events and depressive symptoms among Cypriot university students: a cross-sectional descriptive correlational study. *BMC Public Health* 2013; 13(1): 1121.
- Saias T, Roscoät ED, Véron L, Guignard R, Richard J, Legleye S, et al. Psychological distress in French college students: demographic, economic and social stressors. Results from the 2010 National Health Barometer. *BMC Public Health* 2014; 14(1): 256.
- Sidana S, Kisbore J, Ghosh V, Gulati D, Jiloha R, Anand T. Prevalence of depression in students of a medical college in New Delhi: A cross-sectional study. *Australas Med J* 2012; 5(5): 247–50.
- Mikolajczyk RT, Maxwell AE, Naydenova V, Meier S, el Ansari W. Depressive symptoms and perceived burdens related to being a student: Survey in three European countries. *Clin Pract Epidemiol Ment Health* 2008; 4:19.
- Royal College of Psychiatrists. *College Report CR166: Mental health of students in higher education*. London (UK): Royal College of Psychiatrists; 2011.
- Expert Group on Youth Development and Health of the Ministry of Health of Serbia. *Strategy for youth development and health in the Republic of Serbia*. Belgrade: Ministry of Health of the Republic of Serbia; 2006.
- Talaei A, Fayyaz MR, Ardani AR. Depression and Its Correlation With Self-esteem and Social Support Among Iranian University Students. *Iran J Psychiatry* 2009; 4: 17–22.
- Shamsuddin K, Fadzi F, Ismail WS, Shah SA, Omar K, Muhammad NA, et al. Correlates of depression, anxiety and stress among Malaysian university students. *Asian J Psychiatr* 2013; 6(4): 318–23.
- Mirković M, Simić S, Trajković G. Assessment of mental health in adults of the northern part of the city of Kosovska Mitrovica. *Vojnosanit Pregl* 2012; 69(9): 747–52.
- Reyes-Rodríguez ML, Rivera-Medina CL, Cámara-Fuentes L, Suárez-Torres A, Bernal G. Depression symptoms and stressful life events among college students in Puerto Rico. *J Affect Disord* 2013; 145(3): 324–30.
- Beck AT, Steer RA. *Manual for the Beck Depression Inventory*. San Antonio, TX: Psychological Corporation; 1993.
- Ignjatović-Ristić D, Hlinić D, Jović J. Evaluation of the Beck Depression Inventory in a nonclinical student sample. *West Indian Med J* 2012; 61(5): 489–93.
- Beck AT, Steer RA. *Beck Anxiety Inventory (BAI) Manual*. Oxford (UK): Pearson; 1990.
- Steptoe A, Tsuda A, Tanaka Y, Wardle J. Depressive symptoms, socio-economic background, sense of control, and cultural fac-



- tors in university students from 23 countries. *Int J Behav Med* 2007; 14(2): 97–107.
29. *Marmot MG, Bell R.* How will the financial crisis affect health. *BMJ* 2009; 338: b1314.
  30. *Eisenberg D, Hunt J, Speer N.* Mental health in American colleges and universities: variation across student subgroups and across campuses. *Int J Behav Med* 2013; 14(2): 97–107.
  31. *Bayram N, Bilgel N.* The prevalence and socio-demographic correlations of depression, anxiety and stress among a group of university students. *Soc Psychiatry Psychiatr Epidemiol* 2008; 43(8): 667–72.
  32. *Christensson A, Vaez M, Dickman PW, Runeson B.* Self-reported depression in first-year nursing students in relation to socio-demographic and educational factors: a nationwide cross-sectional study in Sweden. *Soc Psychiatry Psychiatr Epidemiol* 2010; 46(4): 299–310.
  33. *Yang F, Meng H, Chen H, Xu X, Liu Z, Luo A, et al.* Influencing factors of mental health of medical students in China. *J Hua-zhong Univ Sci Technolog Med Sci* 2014; 34(3): 443–9.
  34. *Uglesić B, Lasić D, Zuljan-Cvitanović M, Buković D, Karelović D, Delić-Brkljačić D, et al.* Prevalence of depressive symptoms among college students and the influence of sport activity. *Coll Antropol* 2014; 38(1): 235–9.
  35. *Mancenska S, Božinovska L, Tece J, Pluncević-Gligoroska J, Sivevska-Smilevska E.* Depression, anxiety and substance use in medical students in the Republic of Macedonia. *Bratisl Lek Listy* 2008; 109(12): 568–72.
  36. *Eisenberg D, Gollust SE, Golberstein E, Hefner JL.* Prevalence and correlates of depression, anxiety, and suicidality among university students. *Am J Orthopsychiatry* 2007; 77(4): 534–42.
  37. *Bostanci M, Oždil O, Oguzhanoglu NK, Oždil L, Ergin A, Ergin N, et al.* Depressive symptomatology among university students in Denizli, Turkey: prevalence and sociodemographic correlates. *Croat Med J* 2005; 46(1): 96–100.
  38. *Alvi T, Assad F, Ramzan M, Khan FA.* Depression, anxiety and their associated factors among medical students. *J Coll Physicians Surg Pak* 2010; 20(2): 122–6.
  39. *Ibrahim AK, Kelly SJ, Glazebrook C.* Analysis of an Egyptian study on the socioeconomic distribution of depressive symptoms among undergraduates. *Soc Psychiatry Psychiatr Epidemiol* 2012; 47(6): 927–37.
  40. *Ghanem M, Gadallah M, Mekey FA, Mourad S, El-Kholy G.* National survey of prevalence of mental disorders in Egypt: preliminary survey. *East Mediterr Health J* 2009; 15(1): 65–75.
  41. *Al-Busaidi Z, Bhargava K, Al-Ismaily A, Al-Lawati H, Al-Kindi R, Al-Shafae M, et al.* Prevalence of Depressive Symptoms among University Students in Oman. *Oman Med J* 2011; 26(4): 235–9.
  42. *Garlow SJ, Rosenberg J, Moore DJ, Haas AP, Koestner B, Hendin H, et al.* Depression, desperation, and suicidal ideation in college students: results from the American Foundation for Suicide Prevention College Screening Project at Emory University. *Depress Anxiety* 2008; 25(6): 482–8.
  43. *Ibrahim MB, Abdelreheem MH.* Prevalence of anxiety and depression among medical and pharmaceutical students in Alexandria University. *Alexandria J Med* 2014. (In Press)
  44. *Goebert D, Thompson D, Takeshita J, Beach C, Bryson P, Ephgrave K, et al.* Depressive symptoms in medical students and residents: a multischool study. *Acad Med* 2009; 84(2): 236–41.
  45. *Baldassin S, Silva N, de Toledo FA, Castaldelli-Maia JM, Bhugra D, Nogueira-Martins MC, et al.* Depression in medical students: cluster symptoms and management. *J Affect Disord* 2013; 150(1): 110–4.
  46. *Field T, Diego M, Sanders C.* Adolescent depression and risk factors. *Adolescence* 2001; 36(143): 491–8.
  47. *Bhasin SK, Sharma R, Saini NK.* Depression, anxiety and stress among adolescent students belonging to affluent families: a school-based study. *Indian J Pediatr* 2010; 77(2): 161–5.
  48. *Abbreviated Country Development Cooperation Strategy, Fiscal Year 2013-2017.* Belgrade: USAID; 2013.
  49. *Dyrbye LN, Thomas MR, Shanafelt TD.* Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Acad Med* 2006; 81(4): 354–73.
  50. *Ozdemir H, Rezakı M.* General Health Questionnaire-12 for the detection of depression. *Turk Psikiyatri Derg* 2007; 18(1): 13–21. (Turkish)
  51. *Al-Qaisy LM.* The relation of depression and anxiety in academic achievement among group of university students. *Int J Psychol* 2011; 3(5): 96–100.
  52. *World Health Organization.* Health 2020: A European policy framework and strategy for the 21st century. Copenhagen (DK): World Health Organization; 2013.

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