

DEPRESSION, ANXIETY AND STRESS DURING THE COVID-19 PANDEMIC AMONG SERBIAN UNIVERSITY STUDENTS

Sofija Colovic^{1,2}, Marija Bozovic³ and Mladen Grujicic⁴

¹Department of Communication Skills, Ethics and Psychology, Faculty of Medical Sciences,
University of Kragujevac, Kragujevac, Serbia

²University Clinical Center Kragujevac, Clinic of Psychiatry, Kragujevac, Serbia

³Institute of Public Health Kraljevo, Serbia

⁴Health Centre Bijeljina, Bosnia and Herzegovina, Republic of Srpska

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Corresponding author:

Sofija Colovic

University of Kragujevac, Faculty of Medical Sciences,
Department of Communication Skills, Ethics and
Psychology, Kragujevac, Serbia

Phone: +381 34 30 60 80

E-mail: sofi007@gmail.com

ABSTRACT

Our study focused at measuring stress, anxiety, and depression among the population of university students in Serbia. The sample included 493 students from The Faculty of Mechanical Engineering and the Higher Medical School, Kraljevo, University of Kragujevac, Central Serbia. The electronic survey was completed in approximately 10 minutes. Data collection was conducted during September and October, 2022. The research instruments included: General Questionnaire (used to collect demographic and personal data before and during the COVID-19 pandemic) and Depression Anxiety Stress Scales (DASS-21). All statistical calculations were performed using the standard commercial, standard software package SPSS, version 18.0. 12.8% of students reported severe and very severe symptoms of depression. In 21.7% of cases, severe and very severe symptoms of anxiety were reported. 20.3% of students reported severe and very severe symptoms of stress. Even though there are several studies on the mental health of Serbian college and university students during the COVID-19 pandemic, our article is unique in that it observes their mental health two years after the onset of the pandemic. This allows us to compare the findings with those obtained for the onset of the pandemic.

Keywords: Depression, anxiety, stress, university students, COVID -19 pandemic.



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INTRODUCTION

In December 2019, the world public had to confront the novel disease, COVID-19, when a new virus, SARS-CoV-2, was detected in the Chinese province of Hubei, in the city of Wuhan. To prevent transmission of the infection COVID-19, the countries worldwide had to implement the recommended epidemiological measures: i.e. the restrictions in gatherings and exercise, social distancing, the lock-downs of social-life facilities, online learning and teaching, and working from home (1). Psychological studies have been emphasizing the general concerns about the mental health, especially in students, who had to face a sudden transition to online learning systems with limited resources (2). This transition brought the difficulties in communicating with professors, the lack of contact and support from peers, the difficulties in obtaining literature, and many other stressful changes; which have been all recognized as the potential sources of significant psychological issues (3). Student mental health during the pandemic has received considerable research attention, and numerous studies have been published worldwide on various aspects of mental health. Reportedly, student mental health deteriorated during the pandemic with varying levels of mental disorders, mainly anxiety, stress, and depression (4-8). Psychological stress, caused by social distancing and reduced social contacts, quarantine regulations, financial worries, frustration, boredom, lack of supplies, and poor communication, led to anger, confusion, anxiety, and depression (9-12). Physical distancing, as one of the most common measures, helped break the chain of infection transmission, but, on the other hand, it had a number of negative psychological effects, such as worries, fears, anxieties, and even the emergence of new mental illnesses (13,14). The findings of several studies conducted in Serbia testify to that. One study aimed at analyzing the psychological responses to COVID-19 pandemic in terms of perceived stress and related factors in the student population of the southeast Serbia. The study was conducted during the increased incidence of COVID-19 and the mean score of perceived stress amounted to 20.43 (± 7.67) (15). Another study was conducted with 580 undergraduate students of medicine at the University of Belgrade during the school year 2020 – 2021. It used Depression Anxiety Stress Scales (DASS-21) and showed that two thirds of the students who participated (age ranging from 21 to 30) reported symptoms of depression, extremely severe forms of anxiety, and severe stress (16). The vulnerability of student population and the deterioration of mental health in this population have been detected in many other countries. One study focused examined the prevalence and predictors of mental health disorders in 2349 students in May and June, 2020; in Poland, Slovenia, Czech Republic, Ukraine, Russia, Germany, Turkey, Israel, and Columbia. The prevalence of severe stress, depression, and generalized anxiety was 61.3%, 40.3%, and 30%, respectively (17).

Even though there are a few studies that were dedicated to measuring the levels of stress, anxiety, and depression of the student population in Serbia two years after the onset of the pandemic. Similar studies were conducted, but during the

early stages. Our findings can be compared with those obtained earlier and as such, they can provide an insight into the potential changes during the different stages of the pandemic.

MATERIALS AND METHODS

The study was conducted as a cross-sectional study during September and October 2022. Since this was the beginning of the given school year, the students were not additionally burdened by tests and exams. It is also important to note that Serbian educational system had already abandoned the online learning regime and students attended their classes regularly. The sample included 493 students from The Faculty of Mechanical Engineering and the Higher Medical School, Kraljevo, University of Kragujevac, Central Serbia. One medical and one non-medical educational profile were selected on purpose, due to our expectations that health-care students might be more willing to provide honest and precise answers. It is also important to highlight that higher medical schools in Serbian educational system do not provide study programs in medicine; they offer additional three-year education in health-care and nursing and can be enrolled after the highschool graduation.

Random sampling was used as the sample selection method. A one-stage sample was formed based on the percentage of students at the given faculties. The sample included the students from all years of study and of both genders. The deans of both faculties were informed in writing about the purpose and method of the survey. They both gave written consents for the survey to be conducted. The ten-minute survey was conducted electronically. It was completely voluntary and anonymous. The response rate was 86%. The respondents provided informed consents after they had been informed about the methodology and the purpose of this study on the first page of the electronic platform used to conduct the survey. The data were treated as highly confidential and were used for research purposes only. The questions that might identify the respondents were avoided. All necessary steps were taken, in accordance with the General Regulation for the Protection of Personal Data, the legislation of the Republic of Serbia, the European Legal Framework, the National Data Protection Act, the Strategy for the Protection of Personal Data, and the Law on Official Statistics Act, in order to protect the privacy and ensure the confidentiality of the data.

The research instruments were linguistically and culturally validated questionnaires in Serbian language. General Questionnaire was used to collect demographic and personal data about students' lives before and during the COVID-19 pandemic. It was used to collect the data on gender, age, type of settlement, faculty, and year of study. In addition, it included the questions inquiring whether the students felt endangered during the pandemic and what the reasons were for them to feel threatened: the fear of getting infected, the fear of endangering family members, the fear that close people (family, friends, etc.) may get infected, the fear of hospitalization, etc.

The standardized Serbian version of Depression Anxiety Stress Scales (DASS-21) was used to measure the levels of depression, anxiety, and stress (18). The questionnaire consists of 21 questions and three subscales which aim at evaluating the levels of depression, anxiety, and stress. The DASS-21 set comprises 3 subscales, with 7 questions per scale which are designed to evaluate the levels of depression, anxiety, and stress during the week prior to the survey. The *Depression* subscale focuses on the basic symptoms of depression: low positive affect, dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest and commitment, anhedonia, and sluggishness. The somatic symptoms present in depressive episodes, according to DSM-IV, such as sleep, appetite, and concentration problems, are excluded from this subscale since they are not specific for depressive disorders only, but also to anxiety disorders. The *Anxiety* subscale focuses on the symptoms of physiological arousal (e.g. dry mouth, breathing difficulties) and the effects on skeletal muscles (tremors), situational anxiety, and the subjective feeling of anxious affect. The *Stress* subscale aims at evaluating the symptoms of general, non-specific arousal, such as difficulty relaxing, nervous excitement, easy excitability and agitation, irritability, hypersensitivity, and impatience. Respondents rate how they have felt during the past week on a 4-point Likert scale, i.e., how strongly/frequently they experienced symptoms of depression, anxiety, and stress, from 0 ("not at all") to 3 ("most of the time or almost always"). Depression, anxiety, and stress scores are determined by summing the scores which can range from 0 – 21 for each subscale. The five categories (Normal, Mild, Moderate, Severe, Extremely Severe) are determined based on the scores, as follows: (1) depression: Normal (0 – 4), Mild (5 – 6), Moderate (7 – 10), Severe (11 – 13), Extremely Severe (≥ 14); (2) anxiety: Normal (0 – 3), Mild (4 – 5), Moderate (6 – 7), Severe (8 – 9), Extremely Severe (≥ 10); and (3) stress: Normal (0 – 7), Mild (8 – 9), Moderate (10 – 12), Severe (13 – 16), Extremely Severe (≥ 17). Extremely severe symptomatology is present if depression score is 14+, anxiety score is 10+, and stress score is 17+. These scores indicate the severity of symptoms, not the degrees of mental disorders (19,20).

The variables taken into consideration here include: (1) Demographic characteristics (gender, age, type of settlement, type of faculty, year of study), (2) Characteristics of life and study during the pandemic COVID -19, and (3) Mental health: i.e. depression, anxiety, stress.

Chi-square (χ^2) test was used to compare differences in the frequency of categorical variables. The correlations between the dependent variables and a set of independent variables were examined by multivariate logistic regression. The risk was assessed by OR (odds ratio) size with a 95%

confidence interval. All results with a probability of less than 5% ($p < 0.05$) were considered statistically significant. All statistical calculations were performed with the standard commercial, standard software package SPSS, version 18.0. (The Statistical Package for Social Sciences software (SPSS Inc, version 18.0, Chicago, IL)).

RESULTS

Socio-demographic characteristics of the student population

493 students participated in the study, 16.6% of which were from the Faculty of Mechanical and Civil Engineering and 76.7% of which were from the Faculty of Higher Vocational Studies. 23.3% of the respondents were male and 76.7% female. The average age of the population was 25.4 ± 8.3 years, with female subjects (26.43 ± 8.8 years) being significantly older than male subjects (22.6 ± 56 years) ($p < 0.001$). The largest percentage of the respondents belonged to the age group 18 – 24. Two-thirds of the respondents lived in urban areas (70.8%). Most students were on the first (34.7%) and third year of their studies (33.1%). The highest percentage of students reported living with their family (84.8%), followed by those living with their partner (7.3%).

Depression

The analysis focused on the symptoms of depression, revealed no significant difference between male and female subjects ($p=0.985$). The severe depression was found in 7.8% of men and 6.6% of women, while extremely severe depression was found in 5.2% of men and 6.1% of women. There was also no significant difference in the average scores between male (4.31 ± 4.61) and female respondents (4.32 ± 4.7), ($p=0.985$). The ANOVA test showed that there was no significant difference ($p=0.379$) between the mean depression scores in terms of age. No significant differences were found between different age groups ($r=0.132$). On the other hand, settlement typed appeared to be relevant. Severe and extremely severe forms of depression were more common in rural areas (11.8% and 7.6%, respectively) than in urban areas (4.9% and 5.2%, respectively), while moderate depression was ten times more common in urban settlements (11.7%) than in rural settlements (1.1%) ($r=0.036$). There was also a significant difference in the mean scores of near-depression between urban (4.02 ± 4.51) and rural settlements (5.05 ± 5.06) ($p=0.027$). There were no significant differences in either depression scores ($p=0.540$) or mean scores ($p=0.611$) with respect to the year of study (Table 1).

Table 1. Prevalence of depression in relation to sociodemographic characteristics of the student population

Variables	Without symptom		Mild depression		Moderate depression		Severe depression		Very severe depression		Average score	p
	n	%	n	%	n	%	n	%	n	%		
Gender												
Total	321	65.1	52	10.5	57	11.6	34	6.9	29	5.9	4.32±4.67	0.985
Female gender	247	65.3	40	10.6	43	11.4	25	6.6	23	6.1	4.32±4.73	
Male gender	74	64.3	12	10.4	14	12.2	9	7.8	6	5.2	4.31±4.61	
Age groups												
18-24	207	62.5	31	9.4	38	11.5	29	8.8	26	7.9	4.80±5.17	0.132
25-29	28	66.7	6	14.3	6	14.3	1	2.4	1	2.4	3.45±3.65	
30-34	20	60.7	7	23.3	3	10.0	0	0.0	0	0.0	2.97±2.76	
35-39	26	74.3	2	5.7	3	8.6	2	5.7	2	25.7	3.49±4.06	
40±	40	72.7	6	10.9	7	12.7	2	3.6	0	0.0	3.35±2.90	
Type of settlement												
Total	32	65.1	52	10.5	57	11.6	34	6.9	29	5.9	4.32±4.67	0.036
Village	83	57.6	17	11.8	16	1.1	17	11.8	11	7.6	5.05±5.06	
Urban	238	68.2	35	10.0	41	11.7	17	4.9	18	5.2	4.02±4.51	
Year of study												
First year	115	67.3	14	8.2	19	11.1	10	5.8	13	7.6	4.25±4.55	0.454
Second year	88	62.9	22	15.7	16	11.4	8	5.7	6	4.3	4.13±4.51	
Third year	108	66.3	14	8.6	18	11.0	14	8.6	9	5.5	4.25±4.55	
Fourth year	4	36.4	2	18.2	2	18.2	2	18.2	1	9.1	6.36±4.34	
Fifth year	6	75.0	0	0.0	2	25.0	0	0.0	0	0.0	2.75±3.15	

Anxiety

The findings demonstrate that there was a statistically significant difference in the mean values of the anxiety scores between male (3.17±3.58) and female respondents (5.00±4.66) ($p=0.000$). The female students were almost three times more likely to have extremely severe (13.5%:4.3%) and severe anxiety symptoms (12.2%: 4.3%). On the other hand, male respondents were seven times more likely (49.7%) to have mild symptoms (20%: 3.3%) and no symptoms of anxiety (63.5%) compared to female students (49.7%), ($p=0.001$). The students who reported living in rural areas had higher mean scores (5.07±4.63) compared to those living in urban areas (4.37±4.43). However, the T-test showed that this difference is not statistically significant ($p=0.115$).

There was also no significant difference in anxiety scores between the studied groups ($p=0.383$). The ANOVA test showed that there was a significant difference ($p=0.001$) between the mean scores among different age groups. The mean scores decreased with age; in the youngest age group, the score was 4.89±4.79, while in the 35 – 39 age group, the mean score was significantly lower (3.23±3.01). Although younger age groups have a higher prevalence of extremely severe and severe anxiety compared to other age groups, the χ^2 test revealed no significant differences in the prevalence of different levels of anxiety among students with respect to age ($p=0.390$). No significant differences in either anxiety scores ($p=0.776$) or mean scores ($p=0.426$) was detected for different years of study (Table 2).

Table 2. Prevalence of anxiety according to sociodemographic characteristics of the student population

Variables	Without symptom		Mild anxiety		Moderate anxiety		Severe anxiety		Very severe anxiety		Average score	p
	n	%	n	%	n	%	n	%	n	%		
Gender												
Total	621	52.9	73	14.8	52	10.5	51	10.3	56	11.4	4.57±4.45	0.001
Female gender	188	49.7	50	3.3	43	11.4	46	12.2	51	13.5	5.00±4.66	
Male gender	73	63.5	23	20.0	9	7.8	5	4.3	5	4.3	3.17±3.58	

Variables	Without symptom		Mild anxiety		Moderate anxiety		Severe anxiety		Very severe anxiety		Average score	p
	n	%	n	%	n	%	n	%	n	%		
Age groups												
18-24	173	52.3	41	12.4	33	10.0	37	11.2	47	14.2	4.89±4.79	0.383
25-29	21	50.0	11	26.2	5	11.9	2	4.8	3	7.1	4.52±4.43	
30-34	15	50.0	5	16.7	5	16.7	3	10.0	2	6.7	4.10±3.82	
35-39	22	62.9	6	17.1	3	8.6	3	8.6	1	2.9	3.23±3.01	
40±	30	54.5	10	18.2	6	10.9	6	10.9	3	5.5	3.80±3.63	
Type of settlement												
Total	621	52.9	73	14.8	52	10.5	51	10.3	56	11.4	4.57±4.45	0.390
Village	69	47.9	24	16.7	13	9.0	17	11.8	21	14.6	5.07±4.63	
Urban	192	5.0	49	14.0	39	11.2	34	9.7	35	10.0	4.37±4.43	
Year of study												
First year	85	49.7	28	16.4	19	11.1	17	9.9	22	12.9	4.84±4.69	0.766
Second year	81	57.9	15	10.7	12	8.6	16	11.4	16	11.4	4.44±4.41	
Third year	84	51.5	25	15.3	20	12.3	18	11.0	16	9.8	4.45±4.43	
Fourth year	5	45.5	3	27.3	1	9.1	0	0.0	2	18.2	5.45±8.10	
Fifth year	6	75.0	2	25.0	0	0.0	0	0.0	0	0.0	2.38±2.13	

Stress

When it comes to stress, the findings reveal that there was a statistically significant difference in the mean scores obtained for male (6.58 ± 4.61) and female respondents (8.46 ± 5.22) ($p=0.001$). Females reported the symptoms of severe (14.6%) and extremely severe stress (8.7%) more often than males (7.5% and 3.5%, respectively) ($p=0.015$). The prevalence of stress in the student population decreases with age. The highest prevalence of stress was found in the younger age group, i.e., 18 – 24-year-olds, with one in ten students (10%) reporting extremely severe stress and one in six students reporting severe stress (15.7%). The lowest prevalence was found among respondents aged 40 and older (this difference is statistically significant ($p=0.015$)).

The ANOVA test showed that there was a significant difference ($p=0.009$) in the mean values of the total stress score between the youngest (8.60 ± 5.49) and the oldest students (6.82 ± 4.04). No significant differences were found in the prevalence of the various stress levels among students in relation to the type of settlement ($p=0.130$), but T-test revealed a statistically significant difference in mean scores between urban and rural areas ($p=0.030$). Students who reported living in rural areas had higher scores (8.81 ± 5.45) compared to those who lived in urban areas (7.70 ± 4.99). The analysis showed that there were no significant differences in either stress scores ($p=0.408$) or in mean score values ($p=0.392$) in relation to the year of study (Table 3).

Table 3. Prevalence of stress according to socio-demographic characteristics of the student population

Variables	Without symptom		Mild stress		Moderate stress		Severe stress		Very severe stress		Average score	p
	n	%	n	%	n	%	n	%	n	%		
Gender												
Total	275	55.8	50	10.1	68	13.8	63	12.8	37	7.5	8.02±5.15	0.015
Female gender	199	52.6	42	11.1	49	13.0	55	14.6	33	8.7	8.46±5.22	
Male gender	76	66.1	8	7.0	19	16.5	8	7.0	4	3.5	6.58±4.64	
Age groups												
18-24	168	50.8	29	8.8	49	14.8	52	15.7	33	10.0	8.60±5.49	0.015
25-29	28	66.7	2	4.8	5	11.9	4	9.5	3	7.1	7.31±4.84	
30-34	22	73.7	3	10.0	3	10.0	2	6.7	0	0.0	6.33±3.78	
35-39	21	60.6	7	20.0	4	11.4	3	8.6	0	0.0	6.74±3.81	
40±	36	65.6	9	16.4	7	12.7	2	3.6	1	1.8	6,82±4,04	
Type of settlement												
Total	275	55.8	50	10,1	68	13.8	63	12.8	37	7.5	8.02±5.15	0.130
Village	76	52.8	10	6,9	19	13.2	25	17.4	14	9.7	8.81±5.45	
Urban	199	57.0	40	11,5	49	14.0	38	10.9	23	6.6	7.70±4.99	
Year of study												

Variables	Without symptom		Mild stress		Moderate stress		Severe stress		Very severe stress		Average score	p
	n	%	n	%	n	%	n	%	n	%		
First year	93	54.4	17	9.9	21	12.3	26	15.2	14	8.2	8.27±5.29	0.408
Second year	78	55.7	20	14.3	14	10.0	20	14.3	8	5.7	7.78±5.05	
Third year	93	57.1	12	74.0	31	19.0	14	8.6	13	8.0	7.95±5.05	
Fourth year	6	54.5	0	0.0	1	9.1	2	18.2	2	18.2	10.0±5.71	
Fifth year	5	62.5	1	12.5	1	12.5	1	12.5	0	0.0	5.63±5.01	

Multivariate logistic regression (depression, anxiety, stress)

Multivariate logistic regression identified gender and age as the most important predictors of stress in the student population, as did the presence of anxiety and depression symptoms. Females were twice more likely to report stress (OR=2.106) than male respondents. The students in the youngest age group (18 – 24 years old) were three times more likely (OR=3.068) to report stress than students who were 40 years and older. Students who had symptoms of anxiety and depression were eight times and five times more likely (OR=8.189 and OR=5.364, respectively) to also report the symptoms of stress.

The most important predictor of anxiety was the fear of death. Students who were afraid of dying were 2.5 times more likely to exhibit symptoms of anxiety (OR=2.492). The association with other mental disorders, namely stress (OR=7.913) and depression (OR=5.520) was also significant in this model. Females were twice more likely to exhibit depression symptoms than male subjects (OR=1.997). Students who exhibited symptoms of anxiety (OR=5.309) and stress (OR=5.634) were five times more likely to also have depression (Table 4).

Table 4. Cross-over odds ratios (OR) and 95% confidence intervals (CI) for stress, anxiety, depression and selected variables

Variable	Category	Stress			Anxiety			Depression		
		OR	95%CI	p	OR	95%CI	p	OR	95%CI	p
Gender	Female	2.106	1.135-3.909	0.018	1.373	0.748-2.528	0.309	1.997	1.063-3.751	0.032
	Male	1			1			1		
Age groups	18-24	3.068	1.28-7.340	0.012	0.693	0.304-1.580	0.384	1.21	0.511-2.862	0.664
	25-29	0.836	0.255-2.743	0.768	1.413	0.481-4.150	0.529	1.216	0.373-3.965	0.745
	30-34	0.505	0.148-1.721	0.275	1.200	0.397-3.630	0.747	1.741	0.526-5.956	0.560
	35-39	1.623	0.513-5.133	0.410	0.468	0.142-1.563	0.211	0.815	0.246-2.70	0.738
	40+	1			1			1		
Faculty*	1	0.698	0.310-1.574	0.387	0.577	0.342-1.678	0.493	0.577	0.342-1.678	0.493
	2	1			1			1		
Year of study	First	0.23	0.026-2.037	0.187	3.000	0.361-24.908	0.309	1.154	0.147-9.084	0.892
	Second	0.278	0.033-2.352	0.240	1.717	0.211-13.961	0.613	1.742	0.220-13.974	0.598
	Third	0.248	0.029-2.141	0.205	2.482	0.305-20.206	0.316	1.278	0.158-0.965	0.845
	Fourth	0.104	0.007-1.573	0.103	3.645	0.291-45.522	0.430	3.645	0.291-45.522	0.430
	Fifth	1			1			1		
Type of settlement	Urban	1.126	0.644-1.967	0.677	1.226	0.744-2.167	0.576	0.383	0.395-1.180	0.576
	Village	1			1			0.171		
Anxiety	Yes	8.189	4.784-14.016	0.001				5.309	3.006-9.376	0.001
	No	1						1		
Depression	Yes	5.364	3.017-9.537	0.001	5.52	3.074-9.940	0.001			

Variable	Category	Stress			Anxiety			Depression		
		OR	95%CI	p	OR	95%CI	p	OR	95%CI	p
	No	1			1					
Stress	Yes				7.913	4.651-13.463	0.001	5.634	3.232-9.822	0.001
	No				1			1		

*1-Engineering and construction 2 - Higher vocational school

DISCUSSION

The pandemic COVID-19 quickly became one of the largest global crises. It has had serious and far-reaching consequences on health systems, economies, and societies. The changed contexts of education, work, movement, gatherings, behavior, leisure activities, life with family and partners, have certainly affected almost the entire global population. The fear of the unknown during the pandemic has negatively affected all areas of life, including the mental health of children and adults (1). Although our study was conducted two years after the onset of the pandemic, the findings are alarming. The symptoms of depression were reported by 34.9%, of anxiety by 47.1% and of stress by 44.2%. Severe and extremely severe depression, anxiety and stress scores were detected in 12.8%, 21.7%, and 20.3% of participants, respectively. However, if these results are compared to the findings of one study conducted at the beginning of the pandemic, we can observe that levels of stress, depression, and anxiety declined. Reportedly, at the onset of the pandemic, 64.5% of students reported the symptoms of depression, 66.8% severe levels of anxiety, and 66.7% extremely severe symptoms of stress (15). These results may suggest that students adapted to new circumstances and developed coping mechanisms.

Longitudinal studies comparing mental health before and during the pandemic are scarce. One study with 254 students in the UK revealed a significant increase in depression and a decrease in well-being during the first lockdown (April/May 2020) compared to the state of psychological well-being prior to the pandemic. The authors found that over a third of the participants were clinically depressed at the time of isolation, i.e. there had been an increase of 15% in comparison to the levels prior to the pandemic (21). Another longitudinal study of 214 UK university students found a decline in levels of mental well-being and an increase in levels of perceived stress during the first lock-down (22).

The study conducted with the students of Higher Healthcare Vocational School in Belgrade before the pandemic used DASS-42. Their findings indicate that depression, anxiety, and stress were present in 13.6%, 25.6%, and 26% of students, respectively. These values are significantly lower than those reported by the studies conducted during the pandemic (16,17) but also lower than the values obtained through our study. This clearly indicates that the pandemic has had a significant impact on the mental health of the student population.

A study on the mental health under the "COVID -19 measures" revealed a very prominent presence of moderate to severe depression (48%), anxiety (about 38%) and suicidal thoughts (18%). No less than 71% of the respondents reported an increase in stress and anxiety during the pandemic, while less than half of the respondents (about 43%) reported being able to adequately manage stress (23). Study by Ma et al. included more than 700,000 Chinese students and it found that nearly 45% of their cohort suffered from mental health problems, with anxiety being the most common symptom (7). A study by Chen and Lucock included 1173 undergraduate and postgraduate students at one university in the UK. They found that more than 50% of the subjects had anxiety and depression levels above the clinical borderline level (24). Similarly, a multinational study conducted among college students in nine countries found a high prevalence of stress (61.3%), depression (40.3%), and anxiety (30%) (25).

Large survey studies of the mental health in college students conducted in the UK have found high levels of anxiety and depression, increased sedentary behavior, and poor quality of sleep (26,27).

Our results showed, when it comes to stress, that there was a statistically significant difference in the mean scores obtained for male and female respondents. Females reported the symptoms of severe (14.6%) and extremely severe stress (8.7%) more often than males (7.5% and 3.5%, respectively). The prevalence of stress in the student population decreases with age. No significant differences were found in the prevalence of the various stress levels among students in relation to the type of settlement and in relation to the year of study.

The female students were almost three times more likely to have extremely severe (13.5%:4.3%) and severe anxiety symptoms (12.2%: 4.3%). On the other hand, male respondents were seven times more likely (49.7%) to have mild symptoms (20%: 3.3%) and no symptoms of anxiety (63.5%) compared to female students (49,7%). Severe and extremely severe forms of depression were more common in rural areas (11.8% and 7.6%, respectively) than in urban areas (4.9% and 5.2%, respectively), while moderate depression was ten times more common in urban settlements (11.7%) than in rural settlements (1.1%). And other studies have shown similar results to ours (16,17). Contrary to our results, some studies have shown that older students have a higher frequency of depressive symptoms (28). Some of the reasons for older students to be more psychologically burdened compared to

younger ones may include: uncertainty of their future after the graduation, concerns about finding employment, financial uncertainty, the expectations of the environment that a young person of this age should be accomplished in significant social roles such as getting married and having offspring (29-31).

The pandemic has changed the conditions of our everyday life. The full impact of these changes and all consequences are yet to emerge. Hence, the outcomes still cannot be fully understood. Due to the rapid spread of the virus and its negative effects on mental health, the importance of developing adequate programs for the prevention of mental disorders in student population must be highlighted. The results of this study testify to the fact mental health of the youth should be monitored through consistent and comprehensive research.

This study is unique in that we aim at measuring stress, anxiety, and depression among students two years after the onset of the pandemic. Our findings can be compared with those obtained earlier and as such, they can provide an insight into the potential changes during the different stages of the pandemic. However, our study has certain limitations related to the coverage of the student population. Students of different profiles and from different regions of Serbia should be included, which can be the subject of a subsequent study.

CONCLUSIONS

In order to create adequate public health policies and strategies that are needed to improve mental health and prevent mental disorders during the COVID-19 pandemic, it is essential to determine and expose different predictors of mental health. These findings can improve our future preparedness in case of other unexpected pandemic or disaster. Seen from a public health perspective, the promotion of mental health and the prevention of mental disorders in the student population is essential for achieving the progress of the whole society.

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INSTITUTIONAL REVIEW BOARD STATEMENT

Deans of the Faculty of Mechanical Engineering and the Higher Medical School, Kraljevo, University of Kragujevac, Central Serbia, gave written consents for the survey to be conducted.

INFORMED CONSENT STATEMENT

Informed consent was obtained from all subjects involved in the study.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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