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Depression, Anxiety, Stress and Physical Activity in Health-Related University Students during COVID-19 †

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Abstract: The coronavirus disease 2019 (COVID-19) pandemic led to an increased negative affective condition among university students. It is well-established that physical activity has positive effects on mental health and well-being, but due to gym closure as a restriction measure, levels of students' physical activity may decrease. This cross-sectional study aimed to define the levels of depressive, anxiety, and stress symptoms along with physical activity among health-related university students during the second partial COVID-19 lockdown. The survey included 212 students from the Faculty of Dental Medicine and Health of the University of Osijek in Croatia. To estimate the levels of depression, anxiety, and stress, the Depression Anxiety Stress Scale-21 (DASS-21) and the Godin–Shephard Leisure-Time Physical Activity Questionnaire (GSLTPAQ) questionnaires were used. The majority of students (57.1%) reported increased stress levels during the second COVID-19 lockdown, and 58% reported decreased physical activity. A high prevalence of depressive (52.8%), anxiety (51.9%), and stress (54.7%) symptoms were found among health-related university students, with 33% of students being insufficiently active. The results of this study suggested a high prevalence of negative affective conditions (depression, anxiety, and stress) and decreased physical activity among health-related university students during the second partial lockdown. The resulting symptoms were mostly of mild intensity; however, we consider this a significant mental health issue during the COVID-19 pandemic. It is crucial to monitor and promote students' mental health, especially in more affected females, to reduce the negative impact of this pandemic.

Keywords: anxiety; COVID-19; depression; physical activity; stress

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1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is nowadays a major global health issue. Many of the introduced restriction measures have affected entire populations' mental and physical health. Given the whole situation, it is essential to maintain a certain level of physical activity. This whole situation affected the stress level of the students. Stress is an etiological factor for many mental and physical illnesses, including anxiety and depressive disorders [1–3]. Psychological problems in students are a global problem and present a risk to their health, academic performance, and future careers [4]. University students are a population at risk for mental health, especially during the COVID-19 pandemic [4–6]. High depression, anxiety, and stress levels are commonly reported among health-related university students [7]. Likewise, the current partial lockdown in Croatia could negatively affect students' mental health. Previous studies have identified many stressors contributing

to raised stress, anxiety, and depressive symptoms among students [8,9]. Nevertheless, the COVID-19 pandemic is associated with some new and previously rarely described risk factors. Restrictive measures may increase stress and psychological pressure on students because they are unable to fulfill their curriculum.

Numerous global studies show a significant decline in student physical activity, ranging from 48% to 61%, compared to the years prior to the COVID-19 [10,11]. In addition, before the COVID-19 pandemic, reports on students' quality of life suggest the presence of other non-communicable diseases such as mental disorders, sadness, anxiety, and stress [7]. Adverse side effects of the poor psycho-physical condition include elevated stress levels, which are an etiological risk factor for developing anxiety and depressive disorders [1–3]. Furthermore, students frequently struggle to manage the demands of their study program, which ultimately results in psychological issues that pose a real threat to their health, making it harder for them to succeed academically and hindering the development of their future careers [4]. Additionally, the disordered nature of society—i.e., the many restrictions—caused social unrest and produced unfavorable emotional and mental states. Therefore, students have a crucial role in the psycho-physical condition of the population's overall health, having immediate unintended effects [12,13].

The period of lockdown and numerous restrictions will lead to social distress followed by increased psychological tension and mental problems. Furthermore, the immediate health consequences, mental issues, and physical fitness influences might significantly impact public health [12,13]. The COVID-19 pandemic disrupted mental health services, and the most vulnerable youth population very rarely seek help. During the initial phase of the COVID-19 pandemic, it was shown that the student population was at a higher risk of anxiety, depression, and stress, in response to the outbreak of COVID-19 compared to older adults [3,6]. In addition, physical activity can reduce harmful restriction measures and positively affect mental health [14]. Physical activity and exercise positively affect mental health, which is essential, especially in a pandemic [6,13,15]. Suppose negative emotions (such as depression and anxiety) developed in the early stages of a pandemic remain without intervention. In that case, there is a possibility that it could lead to post-traumatic stress disorder.

Studies have shown that the various stress coping techniques used by men and women cause a considerable difference in mental health. In addition, women had lower levels of physical exercise, which exacerbated depression symptoms [16]. It is known that women experience more negative emotional states (such as anxiety and depression) than males do [6,13]. Additionally, several studies revealed that the COVID-19 pandemic was related to greater levels of negative feelings in women [6,7,17,18]. In the COVID-19 epidemic, female students were more likely to report internalized disorders such as stress because they may be more sensitive to environmental stresses than male students [17]. Numerous past stressors have been linked to increased stress, anxiety, and depressive symptoms in students [8,9]. However, the COVID-19 pandemic is connected to several unique and infrequently mentioned risk variables.

The COVID-19 pandemic negatively affects students' mental health and physical activity. Therefore, this study aimed to specify the prevalence of anxiety, depression, and stress symptoms along with physical activity among health-related university students during the second partial COVID-19 lockdown in Croatia. Furthermore, to evaluate the differences between gender mental health, it was also essential to examine how male and female students differed regarding their negative emotional states and physical activity.

2. Participants and Methods

2.1. Participants

This cross-sectional study, conducted from 26 November to 6 December 2020, included 212 students (42 males and 170 females) from the Faculty of Dental Medicine and Health Osijek of the Josip Juraj Strossmayer University of Osijek via an online questionnaire. The Ethical Committee of the Faculty of Dental Medicine and Health Osijek approved the

study, and all participants gave written informed consent. The study was conducted online according to the Declaration of Helsinki and its amendments.

2.2. Questionnaires

Students were invited to complete a questionnaire containing three parts. In the first part, they were questioned about their socio-demographic (age, gender), academic characteristics (study, study program), and self-evaluation of mental stress and physical activity.

The second part consisted of the Depression Anxiety Stress Scale-21 (DASS-21). The DASS-21 questionnaire was used to assess students' prevalence of stress, anxiety, and depression. Lovibond and Lovibond created the DASS-21 to measure negative affective conditions and discriminate between anxiety and depression [19]. We used a short, translated to Croatian, and validated version of DASS-21 [20,21]. DASS-21 consists of three subscales. The first is depression, which focuses on a bad mood, motivation, and self-esteem. The second is anxiety, based on psychological excitement, panic, and fear. The third subscale is stress, and it focuses on tension and irritability. DASS-21 scores were classified as normal, mild, moderate, severe, and extremely severe [19,22].

In the third part, students were asked about their physical activity using the Godin–Shephard Leisure-Time Physical Activity Questionnaire (GSLTPAQ). This questionnaire reports the self-assessment of leisure-time physical activity [23]. Weekly frequencies of mild, moderate, and strenuous activities are multiplied by three, five, and nine. We took only the reported frequency of moderate and severe activities into the calculation for health benefits. Obtained categories correspond to active—more than 24 units, moderately active between 14 and 23 units, and insufficiently active less than 14 units [24].

2.3. Statistical Analyses

A Kolmogorov–Smirnov test was used to evaluate the normality of the data distribution. All numerical variables deviated from a normal distribution. The categorical data were presented with absolute and relative frequencies, while numerical data were described with medians and interquartile ranges (IQR). Mann–Whitney and chi-square tests were used to compare the numerical and categorical data between the two groups. The p-value of <0.05 was considered statistically significant. The analyses were completed using SPSS software (ver. 22.0, SPSS Inc., Chicago, IL, USA).

3. Results and Discussion

We questioned a total of 212 students with a median age of 25 (21–38). Socio-demographic data and self-elevated mental stress and physical activity are presented in Table 1. In the study, more female and undergraduate students participated because the student body consisted dominantly of females. During the second partial lockdown, female students reported increased mental stress and decreased physical activity compared to their male counterparts.

Correlations between the numeric variables are presented in Table 2. Depression was strongly positively correlated with anxiety and stress; moreover, anxiety was also positively correlated with stress. However, no correlation was observed between negative affective conditions and physical activity. In contrast, other research found that physical activity positively correlates with mental health [15].

Table 1. Socio-demographic data and self-assessment of mental stress and physical activity.

Variable	Male 42 (19.8%)	Female 170 (82.2%)	All Students 212 (100%)	*p*-Value
Age, years	25 (21–38)	25 (21–38)	25 (21–38)	0.886 *
Study				
Nursing	23 (54.8%)	148 (87.1%)	171 (80.7%)	<0.001 †
Dental medicine	16 (38.1%)	14 (8.2%)	30 (14.2%)	
Physical therapy	3 (7.1%)	8 (4.7%)	4 (5.2%)	
Study program				
Undergraduate	28 (66.7)	103 (60.6)	131 (61.8)	0.46 †
Graduate	14 (33.3)	67 (39.4)	80 (37.7)	
Self-assessed mental stress				
Reduced	3 (7.1%)	4 (2.4%)	7 (3.3%)	0.029 †
Constant	22 (52.4%)	62 (36.5)	84 (39.6%)	
Increased	17 (40.5%)	104 (61.2)	121 (57.1%)	
Self-assessed physical activity				
Reduced	24 (57.1%)	99 (58.2%)	123 (58%)	0.50 †
Constant	14 (33.3%)	45 (26.5%)	59 (27.8%)	
Increased	4 (9.5%)	26 (15.3%)	30 (14.2%)	

p-values present the difference between male and female students. * Mann–Whitney test; † Chi-square test.

Table 2. Correlations of age, GPA, BMI, scores of the Depression Anxiety Stress Scale-21 (DASS-21), and Physical Activity (GSLTPAQ) scales (n = 212).

	Depression	Anxiety	Stress	Physical Activity
Age	−0.093	−0.068	−0.022	−0.146 *
Depression		0.794 **	0.841 **	0.052
Anxiety			0.860 **	−0.087
Stress				−0.036

* $p < 0.05$ Spearman's rho, ** $p < 0.01$ Spearman's rho.

Gender-related differences of the DASS-21 and the Godin–Shephard Leisure-Time Physical Activity Questionnaire are shown in Figure 1. It is observed that female students had significantly higher levels of negative affective conditions than male students. The results show that female students probably have more significant mental health problems. Previous studies have also shown that female students are more likely to develop depression and anxiety [6,7,13].

Female students scored lower on physical activity than their male counterparts. Physical activity in leisure time positively affects mental health and well-being. Reduced physical activity is a risk factor for elevated mental stress [13,15]. That is especially evident during the COVID-19 lockdown, as leisure time increases while exercise and sports are limited.

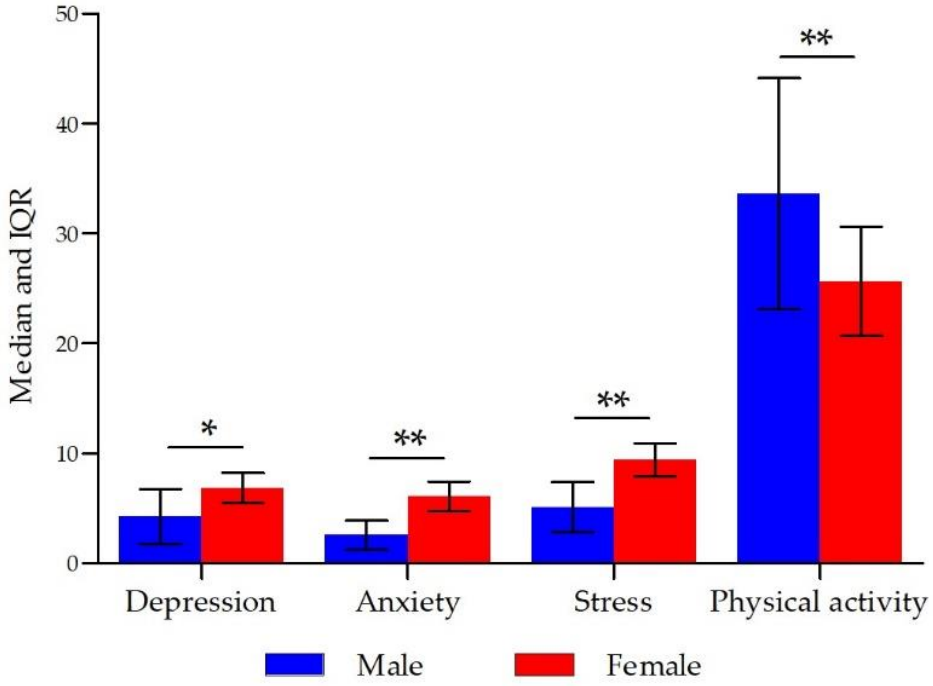

Figure 1. Gender-related differences in students' scores on the Depression Anxiety Stress Scale-21 (DASS-21) and the Godin–Shephard Leisure-Time Physical Activity Questionnaire (n = 212). * Mann–Whitney U test $p < 0.05$, ** Mann–Whitney U test $p < 0.001$. IQR—interquartile range.

The prevalence of the DASS-21 and Godin–Shephard Leisure-Time Physical Activity Questionnaire, divided by categories based on pre-defined cut points, is shown in Table 3. Most of the male students scored within the normal range for symptoms of depression, anxiety, and stress. Two-thirds of female students showed significant anxiety and stress symptoms, while slightly more than half of the female students were depressed. The differences between the two groups are statistically significant. At the same time, more than one-third of female students are insufficiently physically active. However, negative emotional states and decreased physical activity levels did not correlate significantly. Gender significantly impacts the severity of anxiety, stress, and depression symptoms, as seen in other studies [3,4].

According to other studies [3,4,25], gender significantly influences how severe an individual's anxiety, stress, and depression symptoms are. Compared to men, women experience higher levels of adverse affective disorders such as anxiety and depression [6,13]. According to some research, the prevalence of anxiety symptoms in females was 57.8% [7], which is comparable to our 58.2% finding. Similar to the study of Kecojevic et al. [17], male students showed much lower levels of stress symptoms than their female counterparts (39.4%), with 69% of male students having normal stress levels (Table 3).

The sample was biased toward females due to the current student body consisting dominantly of female students, which could impact the study results. As seen in Table 3, the majority of male students had normal levels of negative emotional states, while less than 50% of female students had normal levels of depression, anxiety, and stress. That is especially seen in some DASS-21 categories where percentages are very low, such as moderate anxiety and extremely severe stress levels.

Table 3. The prevalence of the categories of depressive, anxiety, and stress symptoms according to the Depression Anxiety Stress Scale-21 (DASS-21) and Godin–Shephard Leisure-Time Physical Activity Questionnaire (GSLTPAQ). Again, groups are divided by gender (n = 212).

DASS-21		Males, n (%)	Females, n (%)	All Students, n (%)	*p*-Value *
Depression	Normal	25 (59.5)	75 (44.1)	100 (47.2)	0.003
	Mild	4 (9.5)	18 (10.6)	22 (10.4)	
	Moderate	8 (19)	29 (17.1)	37 (17.5)	
	Severe	4 (9.5)	25 (14.7)	29 (13.7)	
	Extremely severe	1 (2.4)	23 (13.5)	24 (11.3)	
Anxiety	Normal	31 (73.8)	71 (41.8)	102 (48.1)	<0.001
	Mild	5 (11.9)	28 (16.5)	33 (15.6)	
	Moderate	0	9 (5.3)	9 (4.2)	
	Severe	3 (7.1)	14 (8.2)	17 (8)	
	Extremely severe	3 (7.1)	48 (28.2)	51 (24.1)	
Stress	Normal	29 (69)	67 (39.4)	96 (45.3)	<0.001
	Mild	4 (9.5)	27 (15.9)	31 (14.6)	
	Moderate	2 (4.8)	20 (11.8)	22 (10.4)	
	Severe	7 (16.7)	28 (16.5)	35 (16.5)	
	Extremely severe	0	28 (16.5)	28 (13.2)	
GSLTPAQ	Active	26 (61.9)	71 (41.8)	97 (45.8)	0.008
	Moderately active	9 (21.4)	36 (21.2)	45 (21.2)	
	Insufficiently active	7 (16.7)	63 (37.1)	70 (33)	

p-values present the difference between male and female students. * Mann–Whitney U test.

4. Conclusions

This study highlights that during Croatia's second partial COVID-19 shutdown, anxiety, depression, and stress symptoms were widespread among university students. Furthermore, the majority of students were physically inactive. Female students were much less physically active and had significantly higher negative emotional states than their male counterparts. During the COVID-19 pandemic, efforts are required to improve positive mental health and well-being. Physical activity is good for promoting health and well-being during times of uncertainty. Universities should offer early detection and prevention programs. Interventions for depression and anxiety among students should be conducted before graduation, since it may have long-term effects on their future careers as health-care professionals. Finally, it is essential to monitor and promote students' mental health, particularly in more affected women, to reduce the pandemic's adverse effects.

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

Data Availability Statement: The dataset generated during the study is available from the corresponding author on reasonable request.

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