



## Research Article

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# The Impact Coronavirus Disease 2019 (COVID-19) on Physical Activity and Mental Health of Students

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## Abstract

**Background:** The novel coronavirus disease 2019 (COVID-19) seems to be having a significant impact on physical activity behaviors globally. The pandemic has forced many of us around the world to remain reception and self-isolate for a period of your time. **Aims and Objectives:** The aim of this paper was to find out how much the measures due to the COVID-19 pandemic affected the daily lives and how the measures affect the physical activity and mental health of students after 81 days. **Materials and methods:** A total of 67 participants have answered the questionnaire. The participants were 48 (71.6%) males and 19 (28.4%) females. The mean age of all participants 22.28 years. **Study Design and Setting:** The questionnaire is divided into several different chapters: personal characteristics, sleep habits, level of physical activity, social functioning and viewing habits, general health condition, COVID-19. **Statistics:** Statistical differences between male and female students were tested using the chi-square test and t-test. A p-value of < 0.05 was considered statistically significant. **Results:** Inactivity had a more negative effect on the male population than on women. In this article, the author will highlight the potential impact of the COVID-19 outbreak on the physical activity and mental health of students. The data showed that the COVID-19 pandemic lockdown affected the academic performance of most participants. **Conclusion:** Home-based activities provide an opportunity for students to stay fit and healthy by practising simple movements while staying at home without the usual student obligations. We see that student confinement did not affect both sexes the same.

**Keywords:** COVID-19, Physical activity, Mental health, Students.

## INTRODUCTION

Novel coronavirus 2019 (COVID-19) has emerged as a worldwide health concern. The World Health Organization (WHO) declared the coronavirus epidemic a pandemic. On March 13, the WHO stated that Europe had become the new epicenter of the pandemic [1]. In Bosnia and Herzegovina based on the recommendations of the crisis committee and civil protection of the Federation of Bosnia and Herzegovina, in order to prevent the occurrence of patients with coronavirus, the Ministry of Education and Science of Tuzla Canton gives notice to the public that the 12 March 2020 year, will not be teaching in primary and secondary schools, and to higher education institutions in the Tuzla Canton. From that date until 01 June 2020 classes begin to realize through TV school, zoom platforms, and other modes of communication for a period of 81 days.

Employees are as of now during the time spent changing to web based showing stages [2]. Colleges have moved quickly to progress different courses and projects from eye to eye to online conveyance mode [3, 4]. Because of the quick increment of COVID-19 cases around the world, colleges drop or delay all occasions, sports, workshops, meetings, and different exercises for an uncertain timeframe. Regardless of the general wellbeing need of these social-removing measures so as to slow the spread of COVID-19 and guarantee that clinical offices have sufficient assets to address needs, they may force limitations on people's capacity to draw in inadequate degrees of physical action so as to keep up wellbeing and prevent further disease.

Physical activity (PA) can be defined as an activity that is realized by activating the skeletal muscles of the whole body and resulting in energy consumption. PA encompasses all movements, ie movement in daily life, including work, recreation, and sports activities, and is categorized according to the level of intensity, from low to moderate, to strong, ie high intensity. PA is seen in many forms and contexts, and it is under the strong influence of cultural heritage [5].

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PA is undoubtedly an important factor in achieving optimal health, and it also reduces the risk of various diseases, which is confirmed by many studies conducted around the world [6, 7]. On the other hand, the literature has consistently provided evidence regarding the diverse health benefits that PA promotes [8], especially to the cardiovascular and metabolic [9], and immunological system [10].

More recently, the literature began to indicate evidence that health is expounded not only to the regular practice of PA, but also to reduced sedentary behavior, in other words, time spent sitting, lying down, or reclining during the day, excluding sleep hours [11].

Sedentary behavior, by definition, is low energy expenditure work performed in sitting or reclining positions. Sedentary behavior may impose detrimental effects on well-being and quality of life [12]. Moreover, it influences the danger of diseases, independent of the extent of individual PA. It's documented that sedentary behaviors, including television viewing, total sitting time, general screen time, sedentary occupational time, and total sedentary time, are all related to with lower PA among adults [13].

The aim of this paper was to use this short anonymous survey to find out how much the measures due to the COVID-19 pandemic affected the daily lives and how the measures affect the physical activity and mental health of students after 81 days.

## MATERIALS AND METHODS

### Design and sample

**Study Participants.** A cross-sectional study was conducted on June 1, 2020, among 1-4 year students at the Faculty of Physical Education and Sport in Tuzla and Sarajevo, Republic Bosnia and Herzegovina. Enrolment in the study was on a voluntary basis and it included ( $n = 67$ ) students from the Republic of Bosnia and Herzegovina. Questionnaires were administered during free time. Answering the questionnaires took an average of 30 minutes. All pupils who participated in this study were subjected to testing under the same conditions, after having given their written agreement for participation.

### The sample of variable

The questionnaire is divided into several different chapters: *personal*

*characteristics (4), sleep habits (2), level of physical activity (2), social functioning and viewing habits (14), general health condition (5), COVID-19 (7).* This work presents the data about the 81 days effects of the COVID-19 pandemic on PA in young adult university students of Faculty of Sport and Physical Education its associations with physical activity and mental health of students.

### The statistical analysis

Statistical differences between male and female students were tested using the chi-square test and *t*-test. A *p*-value of = 0.05 was considered statistically significant. Quantitative data is reported using means and standard deviation. Statistical analyzes were performed with SPSS v. 23.0 software (SPSS Inc., Chicago, IL, USA).

## RESULTS

Results in the (Table 1.) indicate a significant differences in body weight in men ( $M = 76.80, SD = 9.10$ ) and ( $M = 78.72, SD = 0.79$ ),  $t(47) = 7.26, p < .000$  before and after suspension measures. No differences in body weight were observed in women. A significant increase in BMI was observed in men ( $M = 23.08, SD = 2.13$ ) and ( $M = 23.66, SD = 2.36$ ),  $t(47) = 7.26, p < .000$  as opposed to women.

In the (Table 1.) the survey's indication that all students feel no stress or find it hard to sleep even after the lockdown also speaks to the pandemic's psychological impact on *sleep habits*.

The global outbreak of COVID-19 has resulted in closure of gyms, stadiums, pools, dance and fitness studios, physiotherapy centres, parks and playgrounds. Many students are therefore not able to actively participate in their regular individual or group sporting or physical activities outside of their homes. The average *level of physical activity* in men and women decreased significantly (Table 1.). Men on average spend walking less per week ( $M = 281.32, SD = 162.05$ ) and ( $M = 187.69, SD = 129.54$ ),  $t(47) = 4.38, p < .000$  or 93.62 min. Women on average spend walking less per week ( $M = 288.33, SD = 196.56$ ) and ( $M = 180.00, SD = 121.70$ ),  $t(18) = 3.45, p < .003$  or 108.33 min. Men on average spend various sports activities less per week ( $M = 191.52, SD = 246.71$ ) and ( $M = 110.43, SD = 90.37$ ),  $t(47) = 2.22, p < .031$  or 81.08 min. Women on average also spend less per week ( $M = 160.55, SD = 111.32$ ) and ( $M = 94.44, SD = 57.82$ ),  $t(18) = 2.40, p < .028$  or 66.11 min.

**Table 1:** Personal characteristics, sleep habits and level of physical activity among male and female students.

Characteristics	Gender	Before ( $x \pm SD$ )	These days ( $x \pm SD$ )	p value
Age ( $x \pm SD$ ) (years)	M	22.40 (2.30)	22.62 (2.30)	.000
	F	21.31 (.94)	21.54 (.94)	.000
Height in (cm)	M	182.30 (7.07)	182.30 (7.07)	n.s.
	F	171.44 (6.16)	171.44 (6.16)	n.s.
Weight in (kg)	M	76.80 (9.10)	78.72 (9.79)	.000
	F	63.94 (7.60)	64.67 (7.84)	n.s.
Body Mass Index ( $kg/m^2$ )	M	23.08 (2.13)	23.66 (2.36)	.000
	F	21.73 (2.25)	21.97 (2.31)	n.s.
My sleep time	M	8.14 (1.36)	8.12 (1.59)	n.s.
	F	8.68 (1.52)	8.42 (1.30)	n.s.
Wake-up time in hours	M	15.85 (1.36)	15.87 (1.59)	n.s.
	F	15.31 (1.52)	15.57 (1.30)	n.s.
Estimate how much time you spend walking for recreation or transport (min.).	M	281.32 (162.05)	187.69 (129.54)	.000
	F	288.33 (196.56)	180.00 (121.70)	.003
How much time DAY do you spend doing various sports activities or other forms of recreation (min.).	M	191.52 (246.71)	110.43 (90.37)	.031
	F	160.55 (111.32)	94.44 (57.82)	.028

According to the Paired-Samples T-Test, n.s., not significant

To the questions asked in (Table 2.), we can state that students spend more time in their homes (*indoors*) men ( $M = 7.54, SD = 4.43$ ) and ( $M = 11.02, SD = 7.65$ ),  $t(47) = 3.83, p < .000$ . Men spend more for 3.47 hours. Women spend less time indoors compared to men ( $M = 6.15, SD = 3.57$ ) and ( $M = 8.84, SD = 5.33$ ),  $t(18) = 2.44, p < .025$ . Women spend more for 2.68 hours. To the question asked „*how many hours do you spend outside your house, apartment, home?*“ we can conclude that men spend outside ( $M = 8.00, SD = 3.51$ ) and ( $M = 5.33, SD = 3.72$ ),  $t(47) = 4.13, p < .000$ . A significant difference was also observed in women ( $M = 8.94, SD = 4.18$ ) and ( $M = 6.06, SD = 4.18$ ),  $t(18) = 2.02, p = .050$ . Men spend less time outside for 2.66 hours and women spend less time outside for 2.89 hours.

Unfortunately, the pandemic has significantly affected students to spend less time *listening to lectures* men ( $M = 4.62, SD = 2.09$ ) and ( $M =$

$1.47, SD = 2.03$ ),  $t(47) = 7.56, p < .000$ . A negative trend is also noticeable among women ( $M = 5.42, SD = 1.89$ ) and ( $M = 1.63, SD = 2.29$ ),  $t(18) = 5.29, p < .000$ . Men, on average, listen less to lectures for 3.14 hours. Women listen less to lectures for 3.78 hours.

It is very interesting to mention that men differ statistically in relation to women in the following questions: *less work for study and exam preparation* ( $M = 111.87, SD = 85.24$ ) and ( $M = 89.00, SD = 65.15$ ),  $t(47) = 2.40, p < .020$  or 22.87 min., *estimate how much time (minutes per day) you spend in front of TV screens* ( $M = 98.85, SD = 132.33$ ) and ( $M = 168.85, SD = 196.15$ ),  $t(47) = 2.82, p < .007$  or 69.89 min., *using a computer or tablet (iPad)* ( $M = 103.54, SD = 141.68$ ) and ( $M = 171.25, SD = 206.37$ ),  $t(47) = 4.18, p < .000$  or 67.70 min., *more entertainment (music, movies, social networks)* ( $M = 140.83, SD = 134.68$ ) and ( $M = 191.45, SD = 149.45$ ),  $t(47) = 4.71, p < .000$  or 50.62 min.

**Table 2:** Viewing habits among male and female students.

Characteristics	Gender	Before (x ± SD)	These days (x ± SD)	p value
How much time in (hours) per day physically inactive.	M	4.97 (3.98)	5.39 (4.36)	n.s.
	F	5.00 (3.43)	4.26 (3.01)	n.s.
How many hours a day do you spend at home (indoors)?	M	7.54 (4.43)	11.02 (7.65)	.000
	F	6.15 (3.57)	8.84 (5.33)	.025
How many hours do you spend outside your house, apartment, home?	M	8.00 (3.51)	5.33 (3.72)	.000
	F	8.94 (4.18)	6.05 (4.61)	.050
How many hours do you spend at work / college?	M	4.62 (2.09)	1.47 (2.03)	.000
	F	5.42 (1.89)	1.63 (2.29)	.000
Work for study and exam preparation (min.).	M	111.87 (85.24)	89.00 (65.15)	.020
	F	175.26 (102.10)	170.52 (127.29)	n.s.
Estimate how much time (min. per day) you spend in front of TV screens.	M	98.95 (132.33)	168.85 (196.15)	.007
	F	86.84 (87.68)	157.89 (145.54)	n.s.
Use of telephone / mobile phone (min.).	M	258.33 (222.19)	403.33 (704.50)	n.s.
	F	380.52 (601.56)	425.26 (392.63)	n.s.
Using a computer or tablet (iPad) (min.).	M	103.54 (141.68)	171.25 (206.37)	.000
	F	60.00 (64.03)	96.31 (89.76)	n.s.
Information.	M	56.60 (61.46)	60.95 (70.69)	n.s.
	F	41.05 (30.34)	53.68 (51.55)	n.s.
Entertainment (music, movies, social networks) (min.).	M	140.83 (134.68)	191.45 (149.45)	.000
	F	151.57 (104.52)	214.73 (224.11)	n.s.
Job (min.).	M	91.25 (166.97)	90.20 (155.95)	n.s.
	F	50.52 (102.49)	63.15 (119.11)	n.s.

According to the Paired-Samples T-Test, n.s., not significant

When asked if you can assess how general health condition (Table 3.) have changed and other habits given the limitations caused by the epidemic by comparing it to the previous usual period we see that not much has changed. The answers to all questions are the same: *general*

*health status* M: 29 (60.4%), F: 13 (68.4%), *level of physical fitness* M: 18 (37.5%), F: 8 (42.1%), *mental well-being* M: 26 (54.2%), less F: 9 (47.4%), *overall quality of life* M: 20 (41.7%), F: 7 (36.8%), *taking care of their own health* M: 27 (56.3%), F: 7 (36.8%).

**Table 3:** General health condition among male and female students.

Questions	Gender	1. Much worse	2. A little worse	3. Same	4. Better	5. Much better	6. I can not estimate	p value
General health status	M	2 (4.2)	5 (10.4)	29 (60.4)	8 (16.7)	1 (2.1)	3 (6.3)	.000
	F	1 (5.3)	1 (5.3)	13 (68.4)	2 (10.5)	1 (5.3)	1 (5.3)	.000
Level of physical fitness	M	5 (10.4)	14 (29.2)	18 (37.5)	7 (14.6)	2 (4.2)	2 (4.2)	.000
	F	3 (15.8)	4 (21.1)	8 (42.1)	2 (10.5)	1 (5.3)	1 (5.3)	n.s.
Mental well-being	M	4 (8.3)	4 (8.3)	26 (54.2)	9 (18.8)	3 (6.3)	2 (4.2)	.000

	F	3 (15.8)	1 (5.3)	9 (47.4)	4 (21.1)	1 (5.3)	1 (5.3)	.009
Overall quality of life	M	5 (10.4)	12 (25.0)	20 (41.7)	6 (12.5)	4 (8.3)	1 (2.1)	.000
	F	3 (15.8)	2 (10.5)	7 (36.8)	2 (10.5)	2 (10.5)	3 (15.8)	n.s.
Taking care of their own health	M	1 (2.1)	4 (8.3)	27 (56.3)	7 (14.6)	8 (16.7)	1 (2.1)	.000
	F	2 (10.5)	0 (0)	7 (36.8)	6 (31.6)	3 (15.8)	1 (5.3)	n.s.

According to the Chi-Square Test; M, Male; F, Female; Number (%), n.s., not significant

The potentially negative effects of a fearless attitude towards coronavirus are indicated by the results of this research (Table 4.), according to which the student population does not have a pronounced fear of infection. These people feel calm during the

pandemic, are the least worried about their health and even state that the pandemic had no negative effects of fear on their lives. To all questions about COVID-19, students answered „I do not agree at all“.

**Table 4.** COVID-19.

Questions	Gender	1. I don't agree at all	2. I disagree	3. Neither agree nor disagree	4. I agree	5. I totally agree	p value
1. I am most afraid of coronavirus (COVID-19)	M	26 (54.2)	10 (20.8)	8 (16.7)	2 (4.2)	2 (4.2)	.000
	F	9 (47.4)	5 (26.3)	4 (21.1)	1 (5.3)	0 (0.0)	n.s.
2. I'm embarrassed to think about the coronavirus (COVID-19)	M	21 (43.8)	9 (18.8)	9 (18.8)	5 (10.4)	4 (8.3)	.000
	F	8 (42.1)	4 (21.1)	5 (26.3)	1 (5.3)	1 (5.3)	n.s.
3. My hands become sweaty when I think of the (COVID-19)	M	31 (64.6)	11 (22.9)	4 (8.3)	1 (2.1)	1 (2.1)	.000
	F	13 (68.4)	4 (21.1)	2 (10.5)	0 (0.0)	0 (0.0)	.004
4. I'm afraid I'm going to lose my life because of the (COVID-19)	M	29 (60.4)	11 (22.9)	2 (4.2)	3 (6.3)	3 (6.3)	.000
	F	11 (57.9)	5 (26.3)	2 (10.5)	0 (0.0)	1 (5.3)	.005
5. When I watch news and stories about (COVID-19), I become nervous or anxious	M	29 (60.4)	6 (12.5)	8 (16.7)	3 (6.3)	2 (4.2)	.000
	F	9 (47.4)	2 (10.5)	2 (10.5)	3 (15.8)	3 (15.8)	n.s.
6. I can't sleep because I'm worried I'm going to get the (COVID-19)	M	33 (68.8)	8 (16.7)	4 (8.3)	0 (0.0)	3 (6.3)	.000
	F	13 (68.4)	3 (15.8)	3 (15.8)	0 (0.0)	0 (0.0)	.000
7. My heart beats fast or it skips when I think I will get a (COVID-19)	M	31 (64.6)	10 (20.8)	4 (8.3)	0 (0.0)	3 (6.3)	.000
	F	14 (73.7)	3 (15.8)	1 (5.3)	1 (5.3)	0 (0.0)	.000

According to the Chi-Square Test; M, Male; F, Female; Number (%), n.s., not significant

## DISCUSSION

When we look at changes in body weight for the male population of respondents, on average, male students are 1.92 kg heavier, and females are also heavier but 0.73 kg. Sleep habits remained the same as before the pandemic. Men on average spend walking less per week 93.62 min. Women on average spend walking less per week 108.33 min. Men on average spend various sports activities less per week 81.08 min. Women on average also spend less per week 66.11 min. Generally speaking, we can see that students spend less time listening to lectures before the pandemic. The questions relating to COVID-19 show that students are aware of the danger but that is not a negative effect on their psychological status during isolation. The short period of isolation significantly affected the health of the student population.

Several explorations have revealed that during moderate or vigorous exercise, several positive changes occur in the immune system [14, 15]. A sedentary behavior with high levels of sitting time and low levels of PA are associated with increased risks of depression [16], type 2 diabetes, cancer [17], coronary vascular disease (CVD), and mortality [18]. In their studies, the authors Jakobsson *et al.*, [19] cite several negative effects on health status. Only one week of induced sedentary behavior has deleterious effects on mood and depression [20]. Also, one week of reduced step count by 91% significantly reduced myofibrillar protein synthesis rates and upregulate muscle atrophy in male adults [21]. Further, immobilization and sedentary behavior, like TV viewing, are strong risk factors for venous thromboembolism [22].

Previous research physical activity on students PE and Sports author's (Atiković *et al.*, [5] shows on average the students ( $n = 323$ ), both female and male spent  $11.09 \pm 5.54$  hours on PA per week. Body Mass Index was in normal (healthy weight) limits  $23.00 \pm 2.52$  kg/m<sup>2</sup>. A similar study was conducted by the Atiković *et al.*, [23] on a large sample of students from all faculties University of Tuzla was made of ( $n = 330$ ) female students in the chronological age of  $19.3 \pm 1.5$  years, 60.7% and ( $n = 213$ ) male students in the chronological age of  $20.0 \pm 1.8$  years, 39.2%. On the average, the students (both female and male) spent  $5.60 \pm 5.03$  hours on PA per week. Female students spend  $4.05 \pm 4.32$  hours, while male students dedicate  $8.11 \pm 5.30$  hours to PA. It can be concluded that the students practice PA and recreation in principle, but still 1/5 of all students is not active.

PA also includes a major role in mental state and cognitive function because exercise has positive effects in preventing and alleviating depressive symptoms [24], lessening anxiety [25], improving learning [26], and is useful for cognitive functioning in older adults [27]. Regular PA during self-isolation is very important for the prevention of future chronic health conditions thanks to a sedentary lifestyle. Consequently, continued PA is invaluable for maintaining good physical and psychological state when tackling current challenges imposed upon us by COVID-19 [19].

PA guidelines for USA recommend that adults should engage in a minimum of 150 min of moderate-intensity or 75 min of vigorous-intensity PA per week to scale back risks of obesity, cancer, heart condition, diabetes, and other chronic conditions [28]. WHO

recommends 60 min of daily physical activity with moderate to vigorous aerobic intensity, with muscle and bone strengthening thrice weekly (WHO, 2020). For adults and elderly (>17 years), WHO recommends physical activity for 75 min/wk with vigorous aerobic exercise intensity or 150 min/wk of moderate aerobic intensity, with muscle and bone strengthening twice-weekly [29]. For additional health benefits, 300 min of moderate-intensity or 150 min of vigorous-intensity PA per week is recommended.

On the sample, 823 adolescents (mean age: 16.5 ± 2.1 years) authors Zenić *et al.*, [30] in data present that adolescents from both urban and rural areas decreased their physical activity levels (PALs) as a result of imposed measures of social distancing during the COVID-19 pandemic. The results present a big influence of the living environment on the decrease of PAL, with larger negative effects in urban adolescents.

The confinement period is a new situation, during which boredom and stress are threats that could lead the athletes to lose their usual daily pattern and adopt bad nutritional habits, such as sometimes overeating or snacking, especially foods rich in sugars and fats, and ultra-processed foods [31]. Overall, sedentary behavior and insufficient PA have become the main risk factors hazarding health during the initial stage of the COVID-19 outbreak in Bosnia and Herzegovina.

### Conflicts of interest

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

### Authors' Contribution

All authors read and approved the manuscript. All the authors have read and approved the final version of the manuscript and agree with the order of presentation of the authors.

*Almir Atiković:* Main author responsible for data collection and writing of all text.

*Muhamed Tabaković:* Collaborating author in revision of the discussion, revision of all text.

*Selma Sijerčić:* Collaborating author in reviewing the all text.

*Jasmin Bilalić:* Collaborating author in data collection, revision of the methodology.

*Emir Ćorić:* Collaborating author in data collection.

*Jasmin Mehinović:* Collaborating author in data collection, the revision of the whole text and revision of the statistical part.

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