



## Assessment of the physical and emotional health concerning the students' physical activity during the COVID-19 pandemic

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### Abstract

**Introduction.** SARS CoV-2 caused the third global pandemic and by applying quarantine / isolation / lockdown, the movement was restricted, the physical contact between people was reduced, the physical activity was low, but the activities using electronic devices at home were frequent.

**The aim of the study** was to assess the physical and emotional health in relation to the physical activities done during quarantine/ isolation during the pandemic.

**Material and method.** The study was cross-sectional and consisted of completing an online questionnaire. It was conducted in a period of 6 months and it included 334 students. In order to point out the symptoms caused by quarantine / isolation/ lockdown, we considered it useful for students to participate by completing an online questionnaire about physical activities, physical health and emotional state, related to the implications of participating in online courses.

**Results.** The questions in this questionnaire were grouped on the following aspects: physical activity, physical health, emotional state, all in the context of the pandemic period, including the period in which the academic activity was online. Thus, in the first year, there is a positive correlation between physical condition, physical activity, emotional signs and cognitive ones. In the second year, the positive correlation is present between the physical and the affective signs, whereas the negative correlation is between the affective signs, the cognitive ones and the physical activity. In the third year, the positive correlation is obvious between the affective signs, the cognitive ones and the physical activity, whereas the negative one between the physical and cognitive signs, as well as between the physical activity and the cognitive and physical signs.

**Discussions.** There is a link between emotional and cognitive symptoms and physical health. Fear, anxiety, behavioral disorders, and limited physical activity among students during this period can be a public health issue.

**Conclusions.** The COVID-19 pandemic affected the physical and mental state, with a greater resonance for youth, especially pupils and students. Many of them had emotional, behavioral, physical and cognitive symptoms. These symptoms are found to a greater extent in students in the final years, due to the social impact, social and professional integration.

**Keywords:** *physical health, mental state, students,*

### INTRODUCTION

SARS CoV-2 caused the third global pandemic, and the WHO named it Coronavirus 2019 (COVID-19) (1). By applying quarantine / isolation / lockdown, the movement was restricted, the physical contact between people was reduced, the physical activity was low, but the activities using electronic devices at home were frequent (2). Young people, particularly, found it very difficult to manage this isolation. Even before the pandemic, some adolescents preferred to spend their free time in static, sedentary activities to the detriment of physical activity (3).

This is the reason why there were frequent back pains, which is why the need for early intervention is identified . Physiological factors, age and sex (4) amplified during this period by social, demographic and psychosocial

factors are decisive in triggering back pain (5), especially since there are major physiological and biomechanical changes in adolescents (6,7). The body posture is important and sustained by the coordinated action of the elements of the musculoskeletal system, of the central and peripheral nervous system, and also by the percentage of calcium (8) and magnesium (9), given that the skeleton contains about 99% of total calcium whereas magnesium occurs in muscle contraction. This is why it is important to know the normal reference intervals for these ions, in relation to age, sex and the type of physical activity done.

Adolescents and young adults have predominant dorsal and lumbar pains in comparison to adults whose cervical pain is more common (10,11).

For young people, physical exercise, especially in the open air, influences muscle contraction, static and dynamic balance, by maintaining basic motor skills. During the pandemic, they could not be maintained.

The good results obtained in the professional activity of young people depend on the level of physical training but also on the health and motor skills, acquired by physical exercises (12).

Blanco (13) assessed the physical activity of students before the pandemic and during quarantine / isolation and found a decrease in the physical activity and an increase in the sedentary period according to several factors: sex, age, body mass index, alcohol consumption, tobacco, diet, anxiety/ depression.

An episode of a depressive nature in this age group can cause disorders in the context of anxiety, by influencing the lives of the affected persons (14).

Zhang's (15) study in 2020 assessed the impact of physical and social isolation on the level of physical activity and on the emotional moods of young people. The results showed an average of about 23 minutes of physical activity per day, with higher values in boys. As for emotional states, it was found that females better managed and tolerated inactivity periods and the ones caused by isolation.

Kang's study (16) also assessed issues related to the physical and mental condition of adolescents during the pandemic. The results indicated only 12 minutes of physical activity and over 350 minutes of sedentary lifestyle. In this study the results pointed out the lower emotional impact on girls. The study concluded that adolescents had a sedentary lifestyle during the pandemic.

Chen's study (17) aimed at investigating the prevalence of physical activity and the assessment of sedentary behaviour in young people of 10-18 years old and at the same time to evaluate the connection of the two parameters with age and sex. Also based on the questionnaire, physical activity and sedentary behaviour were assessed.

Olaimat's study (18) conducted during the pandemic period debated the importance of the elements of respiratory gymnastics for preventive and curative purposes in order to improve students' lifestyles.

In Romania, on 16th March 2020, the lockdown caused by the COVID-19 pandemic was imposed, and influenced first the elderly (19) and later the youth (20).

Adolescents and young people, by practicing physical activity regularly, have tried to reduce stress, to tone the body muscles, especially the respiratory ones, in order to cope more easily with this pandemic.

The development of the academic activity in the online environment represented for students the decrease of the physical activity by affecting the motor and sensitive behaviour. Thus, there were changes in emotional states,

the anxious states were more intense, coordination, control and ability decreased.

The occurrence of these elements also involved information from the media, which intensified the uncertainty on the data about the virus.

In the university, especially for the students from the Department of Physical Education, the reduction of the physical activity also meant the diminution of the ability specific to the sport they practised.

At the Faculty of Physical Education and Sports there are also students with different disabilities, represented mainly by vertebral static disorders (kyphosis, scoliosis, back pain and low back pain).

The pain symptoms in this case were accentuated, in the context of online academic activities, during which the students spent approximately 10-12 hours/day on the computer, laptop or phone, in a sitting position.

This position accentuated the pain, maintained the deficient position, secondarily influencing the circulatory system, by accentuating the stasis at the level of the lower limbs, but also on the respiratory system, by influencing the position of the thorax.

Daily physical exercises lead to an increased quality of life with lower blood pressure, increased exercise ability and improved mental state (21). Moreover, the diet was influenced during this pandemic by the consumption of foods that would require energy consumption to prevent the accumulation of calories.

In the normal development of young people, especially students, it is very important that the diet be controlled and correlated with regular physical activities, thus keeping the adequate health conditions (22).

This shows once again the prophylactic role offered by regular exercises, a diet adapted to the type of effort made. We are thus talking about primary prophylaxis in order to avoid the onset of certain diseases, but also about secondary prophylaxis for students who already have a pathology and want to avoid complications.

In 2020, Flandios (23) published a study on the relationship between pandemic isolation, stress and eating disorders of more than 50,000 French students.

The young people should be aware of the importance to have good health and the value of physical activity, which has leads to changes in the quality of life and lifestyle (24). In the context created by the pandemic, it was necessary to find solutions to practise physical exercise at home, regardless of the age group (25).

In addition, under the stress conditions caused by the COVID-19 pandemic, exercise may be a prophylactic component to reduce stress that is known to influence cognitive symptoms (26,27)).

The benefits of physical activities are very important and can influence the evolution to well-being and health: increased joint mobility, increased muscle elasticity involved in exercise, increased muscle strength and

endurance, increased ability and coordination, improved static balance and dynamic one, the improvement of the emotional state.

**The aim of the study** was to assess the physical and emotional health in relation to the physical activities done during quarantine/ isolation during the pandemic and the proposal made by specialists for physical exercises to help students eliminate back pain and stress.

**Material and method**

The study was cross-sectional and consisted of completing an online questionnaire.

It was conducted in a period of 6 months and it included students from the Faculty of Physical Education and Sports from "Stefan cel Mare" University Suceava.

Suceava County was the most affected at the beginning of the pandemic, quarantine was first imposed at the national level and later at the regional one.

In order to point out the symptoms caused by quarantine / isolation/ lockdown, we considered it useful for students to participate by completing an online questionnaire about physical activities, physical health and emotional state, related to the implications of participating in online courses.

There were discussions with students and their consent was requested, by taking into account the fact that the collected data is for research purposes only and will not be used elsewhere, by keeping the anonymity of those who fill in the questionnaire and by ensuring the confidentiality of the data.

The questionnaire was filled in by 334 students from the 1st-3rd years of the above faculty. Among the students who filled the questionnaire, 162 (48.51%) were male and 172 (51.49%) were female.

According to the study years, we interviewed 115 (34.43%) students from the first year, 111 (33.24%) from the second year and 108 (32.33%) from the third year. (Table 1)

Table 1. Socio-demographic characteristics of the study group

Gender	1st year		2nd year		3rd year	
F	61 (86.67%)		59 (93.11%)		52 (85.19%)	
M	54 (13.33%)		52 (6.89%)		56 (14.81%)	

  

Age	M	F	M	F	M	F
18-20 years	20	22	14	18	-	-
21-24 years	16	21	17	17	27	24
25-29 years	12	10	13	14	18	19
30-34 years	3	5	5	6	6	5
> 35 years	3	3	3	4	5	4

  

Residence environment	M	F	M	F	M	F
Urban	35	31	28	33	30	26
Rural	19	30	24	26	26	26

**Statistical analysis**

The median and standard deviation were calculated. The Chi-Square test was applied to compare the percentages of risk that were perceived by the students participating in the study.

Correlations were also calculated with the variables sex, age and residence place.

The data were analyzed by using the SPSS program. Values for  $p < 0.05$  were considered statistically significant for a 95% confidence interval.

**Results**

The questions in this questionnaire (Table 2) were grouped on the following aspects: physical activity (physical exercise- duration, frequency, physical activity at home or elsewhere), physical health (fatigue, headache, exhaustion, appetite disorders, myalgias, sleep disorders), emotional state (cognitive disorders- attention disorders, concentration disorders, affective disorders- fear, anxiety, panic, irritability), all in the context of the pandemic period, including the period in which the academic activity was online.

Table 2. Questionnaire on the physical, cognitive and emotional symptoms caused by the COVID-19 pandemic Pearson's correlation coefficient  $r$  was also calculated as it estimates the connection degree between the variables.

In the first year the direct correlation was obtained:

- weak between cognitive symptoms and emotional symptoms = 0.202
- very weak between
  - ✓ physical health and emotional symptoms = 0.148
  - ✓ physical activity and emotional symptoms = 0.156
  - ✓ cognitive symptoms and physical health = 0.173
  - ✓ physical activity and cognitive symptoms = 0.148
  - ✓ physical health and physical activity = 0.039

In the second year it was obtained:

- the direct correlation:
  - ✓ very poor between physical health and emotional symptoms = 0.053
- the inverse correlation, the two variables varying in the opposite direction
  - ✓ weakness between physical activity and physical health = 0.293
  - ✓ very weak between
    - ✚ emotional symptoms and cognitive symptoms = 0.127
    - ✚ emotional symptoms and physical activity = 0.041
    - ✚ cognitive symptoms and physical health = 0.033
    - ✚ cognitive symptoms and physical activity = 0.199

In the third year, a direct correlation and an inverse one were pointed out:

- the direct correlation
  - ✓ weak between emotional symptoms and physical activity = 0.215
  - ✓ very weak between emotional symptoms and cognitive symptoms = 0.019
- the inverse correlation
  - ✓ weak between
    - ✚ cognitive symptoms and physical health = -0.222
    - ✓ very weak between
      - ✚ physical activity and physical health = -0.073
      - ✚ physical activity and cognitive symptoms = - 0.029

**Table 2.** Questionnaire on the physical, cognitive and emotional symptoms caused by the COVID-19 pandemic

QUESTION	Answer	1st year (%)		2nd year (%)		3rd year (%)	
		M	F	M	F	M	F
1. What symptoms did you feel during the pandemic, in the period when the academic activity was online?	Fatigue	7 (12.96%)	11 (18.03%)	9 (17.31%)	12(20.34%)	13 (23.21%)	11 (21.15%)
	Malaise	10 (18.52%)	16 (26.23%)	8 (15.38%)	14(23.73%)	13 (23.21%)	10 (19.28%)
	Decreased appetite	8 (14.81%)	10 (16.39%)	9 (17.31%)	10(16.95%)	9 (16.07%)	10 (19.28%)
	Muscle aches	17 (31.48%)	14 (22.95%)	16 (30.77%)	15(25.42%)	12 (21.43%)	12 (23.08%)
	Disorders	12 (22.23%)	10 (16.39%)	10 (19.23%)	8 (13.56%)	10 (17.86%)	9 (17.31%)
2. Can you specify what were your reactions in the pandemic, when the academic activities were suspended?	Fear	10 (18.52%)	14 (22.95%)	8 (15.38%)	15(25.42%)	12 (21.43%)	12 (23.08%)
	Panic attack	8 (14.81%)	8 (13.11%)	10 (19.23%)	10(16.95%)	7 (12.51%)	7 (13.46%)
	Restlessness	11 (20.37%)	15 (24.59%)	10 (19.23%)	10(16.95%)	12 (21.43%)	10 (19.28%)
	Uncertainty	15 (27.78%)	12 (19.67%)	14 (26.92%)	14(23.73%)	13 (23.21%)	11 (21.15%)
	Impaired sleep	10 (18.52%)	12 (19.67%)	10 (19.23%)	10(16.95%)	12 (21.43%)	12 (23.08%)
3. Can you specify which of the food groups you consumed most often during the lockdown/quarantine / alert period?	Fats	18 (33.34%)	19 (31.15%)	20 (38.46%)	20(33.89%)	18 (32.14%)	16 (30.77%)
	Proteins	20 (37.04%)	22 (36.07%)	15 (28.85%)	20(33.89%)	21 (37.51%)	24 (46.15%)
	Carbohydrates	16 (26.63%)	20 (32.79%)	17 (32.69%)	19(32.21%)	23 (41.07%)	12 (23.08%)
4. During the quarantine / isolation period, was your physical activity influenced?	Yes, totally	27 (50%)	29 (47.54%)	23 (44.23%)	27(45.76%)	24 (42.86%)	20 (38.46%)
	Moderately	12 (22.23%)	13 (21.31%)	10 (19.23%)	12(20.34%)	17 (30.36%)	22 (42.31%)
	Not really	10 (18.52%)	7 (11.47%)	11 (21.15%)	10(16.95%)	12 (21.43%)	8 (15.38%)
	Not	5 (9.26%)	2 (3.28%)	8 (15.38%)	10(16.95%)	3 (5.36%)	2 (3.85%)
5. Can you specify if the period of emergency / lockdown determined the occurrence or accentuation of some cognitive disorders (attention disorder, memory disorders, concentration disorders, excessive care)?	Care disorder	10 (18.52%)	21 (34.33%)	11 (24.14%)	20(33.89%)	15 (26.79%)	17 (32.69%)
	Concentration disorder	12 (22.23%)	20 (32.79%)	14 (26.92%)	17(28.81%)	14 (25%)	12 (23.08%)
	Memory disorder	10 (18.52%)	11 (18.03%)	10 (19.23%)	9 (15.25%)	12 (21.43%)	10 (19.28%)
	Excessive care	8 (14.81%)	6 (9.84%)	12 (23.08%)	10(16.95%)	12 (21.43%)	9 (17.31%)
	I do not know	4 (7.41%)	3 (4.92%)	3 (5.77%)	3 (5.08%)	3 (5.36%)	4 (7.69%)
6. Can you specify what other symptoms you felt during the quarantine /isolation period during online education?	Pain in the cervical spine	11 (20.37%)	14 (22.95%)	10 (19.23%)	11(18.64%)	11 (19.69%)	9 (17.31%)
	Pain in the spine	19 (35.18%)	20 (32.79%)	12 (23.08%)	21(35.59%)	17 (30.36%)	19 (36.54%)
	Pain in the lumbar spine	12 (22.23%)	13 (21.31%)	12 (23.08%)	16(27.12%)	13 (23.31%)	17 (32.69%)
	Lower limb pain	5 (9.26%)	8 (13.11%)	14 (26.92%)	8 (13.56%)	9 (16.07%)	6 (11.54%)
	Visual acuity disorders	7 (12.96%)	6 (9.84%)	4 (7.69%)	3 (5.08%)	6 (10.71%)	2 (3.85%)

**Table 3.** Average and standard deviation in the 1st, 2nd and 3rd study years regarding aspects of physical health, physical activity, emotional and cognitive symptoms

Aspects regarding	1st year (Median ± STD)	2nd year(Median ± STD)	3rd year(Median ± STD)
Physical activity	3.64 ± 0.79	3.59 ± 0.85	3.85 ± 0.79
Physical health	9.34 ± 2.52	9.29 ± 2,536	9.08 ± 2.37
Emotional symptoms	6.63 ± 1.84	6.61 ± 2.34	6.52 ± 2.09
Cognitive symptoms	6.67 ± 2.07	6.64 ± 2.01	6.85 ± 2.23

Thus, in the first year, there is a positive correlation between physical condition, physical activity, emotional signs and cognitive ones. In the second year, the positive correlation is present between the physical and the affective signs, whereas the negative correlation is between the affective signs, the cognitive ones and the physical activity. In the third year, the positive correlation is obvious between the affective signs, the cognitive ones and the physical activity, whereas the negative one between the physical and cognitive signs, as well as between the physical activity and the cognitive and physical signs.

### Discussions

There is a link between emotional and cognitive symptoms and physical health. Especially in the context of the COVID-19 pandemic, the period characterized by restrictions and fear of addressability to a doctor. Often the symptoms presented by a person can be aggravated by the anxiety caused by a possible condition and the impact of certain information transmitted by the media. Fear, anxiety, behavioral disorders, and limited physical activity among students during this period can be a public health issue. Some students try to hide these symptoms from the people close to them, even if they need specialized help (28,29). Cognitive and emotional

disorders can influence activities at school and at university (30). Depression can develop in over 50% of people who have experienced an anxiety episode (31).

Some studies (32) show on the one hand that students may have certain symptoms, which fall into emotional and cognitive disorders, in comparison to people in the same age group but who do not attend university, and on the other hand students may have a high level of stress in comparison to other people of the same age (33). This can be determined by taking exams, assessments, affecting the quality of life and sleep (34).

Students who exercise reduce the effects of stress, improve sleep quality and emotional state, in comparison to students who do not do any physical activity (28,35).

There are studies (34) that report the increase of stress-related diseases in students, accompanied in some cases by mental disorders. The greater the stress, the less the ability to learn, to pay attention, there a diminished academic performance (36).

Even if it is a cross-sectional study, the questions in this questionnaire try to point out the most important symptoms with an impact on the mental, emotional, behavioral development, and last but not least the physical development among students. Longitudinal studies are needed to show the consequences of the COVID-19 pandemic on the youth, including students, but also among other population groups.

After analyzing the online questionnaires, the nutritional behaviour, the development of physical activities and the emotional state of the students from the Faculty of Physical Education and Sports, exercises were designed according to their age, abilities, sex, presence of disabilities and functional capacity. Thus, the students received online instructions about some exercises.

#### Warm-up exercises

Starting from the orthostatic position

a. For the trunk and upper limbs

- The torso in slight extension to enable inhaling and then in slight flexion to enable exhaling
- Trunk inclinations - to enable asymmetrical breathing, especially useful for students with scoliosis - convex inhaling and concave exhaling are favored
- Active movements of the upper limbs for breathing exercises
- Maintaining positions involves static and dynamic contractions of the back muscles, shoulders and shoulder blades
- The abduction movements of the upper limbs enables inspiration, the adduction movements enable the expiration

b. For lower limbs

- Walking on the spot, easy running
- Slight jumps on the spot with the lower limbs close and then apart and abductions of the upper limbs
- Kneeling, squatting

The exercise itself

1. Dorsal decubitus position

- Knee flexion and in turn bringing them to the chest on inspiration and return on expiration
- Vertical shear of the lower limbs at 90°, then at 60°
- Alternate lifting of a lower limb with the knee extended as high as possible
- Horizontal bicycle
- Bending the knee and touching it with the opposite upper limb
- Applying resistance to the abdomen (a book can be used) to increase respiratory capacity

2. Ventral decubitus

- Head extension with support on the lower limbs
- Trunk extension by grasping the ankles with the hands

3. Lateral decubitus

- Raise the free lower limb to 30°, 45°, 60°
- Flexion of the lower limb and touching the floor with the knee

4. Position seated

- Anterior flexion of the torso, knees apart and touching the ground under the chair with your fingertips

5. Knee position

- Knee support, abdominal isometric contraction for 5-6 seconds and relaxation for 10-12 seconds

Each exercise must be repeated 10 times, in 2 sets and accompanied by breathing. At the end of the exercise, the upper and lower limbs will be shaken to relax.

It was explained to the students that it is very important to focus on breathing to regulate emotional state and to reduce anxiety (37). These exercises were recommended daily, and for special situations, 2-3 times a week.

#### Conclusions

The COVID-19 pandemic affected the physical and mental state, with a greater resonance for youth, especially pupils and students. Many of them had emotional, behavioral, physical and cognitive symptoms. These symptoms are found to a greater extent in students in the final years, due to the social impact, social and professional integration.

In the first year the symptoms from the cognitive and emotional sphere were correlated, but in the second and third year their correlation appears with the physical health condition and the development of physical activities.

#### Conflict of Interest:

The authors declared no conflicting interest.

#### Informed consent

The investigated subjects were informed about the purpose of the study, agreeing to the processing of the results of the completed questionnaires, in compliance with the rules on the protection of personal data.

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