

## Original Article

# The practice of physical activity of medical students during the pandemic caused by SARS-CoV-2: a cross-sectional study

## *A prática de atividade física por acadêmicos de medicina durante a pandemia causada pelo SARS-CoV-2: um estudo transversal*

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**ABSTRACT:** Introduction: the context of the SARS-CoV-2 pandemic led to a scenario of social isolation, hindering the practice of regular physical activity. In addition, medical students still have a very high workload. The objective of this study was to assess the quality of life and the prevalence of physical activity and its effects among medical students during the pandemic period. *Methods:* cross-sectional observational study conducted through the application of the questionnaire “Engagement in physical activity among medical students during the pandemic” in 286 students of both genders, from all course periods. *Results:* it was found that the participants on remote medical training who had more motivation and free time exercised more, while the participants who had less motivation and free time decreased their practice of exercises in the analyzed period. *Discussion:* Students understand that physical activity is beneficial, even though it is hindered by strenuous workloads, due to the education they receive in the course. *Conclusion:* it was found that medical students who had remote classes during the period of social isolation considered they had more free time for the practice of exercises. However, not all of the dedicated this time to physical activity.

**Keywords:** Students, medical; Physical activity; Coronavirus; Pandemic.

**RESUMO:** *Introdução:* o contexto de pandemia instaurada pelo SARS-CoV-2 acarretou um cenário de isolamento social, dificultando a prática de atividade física regular. Somado a isso, os estudantes de Medicina ainda possuem uma carga horária sobrecarregada. O objetivo do trabalho foi conhecer a qualidade de vida e a prevalência da prática de atividade física e seus efeitos durante o período de pandemia em acadêmicos de Medicina. *Métodos:* estudo observacional transversal realizado a partir da aplicação do questionário “Prática de atividade física por acadêmicos de Medicina durante a pandemia” em 286 estudantes de ambos os sexos, de todos os períodos de uma faculdade. *Resultados:* notou-se que os participantes, cursando Medicina com ensino remoto, que tinham mais motivação e tempo livre praticavam mais atividade física, enquanto os participantes que tinham menos motivação e tempo livre diminuíram a prática no período analisado. *Discussão:* Os estudantes compreendem que a prática de atividade física é benéfica, mesmo ela sendo impedida por cargas horárias extenuantes, até mesmo devido à educação que recebem durante a graduação. *Conclusão:* constatou-se que acadêmicos de Medicina que possuem aulas de educação remota durante o período estabelecido de isolamento social, consideraram apresentar mais tempo livre para a prática de atividade física. Entretanto, nem todos dedicaram esse tempo para a realização de exercícios.

**Palavras-chave:** Acadêmicos de medicina; Atividade física; Coronavírus; Pandemia.

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## INTRODUCTION

Physical activity can be defined as any bodily movement produced by skeletal muscles that requires more energy expenditure than resting, that is, greater than the standard. Physical activity can reduce the risk factors for various diseases, such as diabetes mellitus and hypertension, and is directly related to better life habits and reduced cardiovascular risk<sup>1</sup>. The Guidelines of the Brazilian Society of Cardiology recommend 60 minutes of exercise 3 to 5 times a week, including warm-up and stretching, aerobic training, muscle resistance exercises, stretching and relaxation<sup>2</sup>.

However, physical inactivity has become increasingly common, especially among young people. This has several reasons, such as the popularization of the automobile, the advancement of technology, and access to elevators and escalators in the most frequented places. For medical students, there is also the influence of the high academic workload and extracurricular activities, and the psychological pressure for having a good curriculum and getting excellent grades during college, which results in less free time and lower willingness to engage in physical activities. As if that wasn't enough, there is still the influence of social and economic factors, such as gender, age and income, which become quite evident when comparing different universities in the city of Curitiba. As a result, medical students are subject to greater levels of stress and at risk for developing several long-term diseases<sup>3</sup>.

A study carried out at the *José do Rosário Vellano* University (UNIFENAS) found that the time devoted to physical activity decreases considerably over the years of the medicine course. Among first-year college students, the time devoted to moderate physical activities was 39.5 min/day, while in the sixth year it was 10 min/day<sup>3</sup>, showing a considerable decline in physical activity<sup>4</sup>.

Currently, the pandemic caused by the new strain of Coronavirus, declared by the World Health Organization on March 11, 2020, has led to the closure of colleges and the need for remote classes, the closure of several places for physical activity, such as gyms and parks, and the need for the social isolation of the population. This made it even more difficult to practice exercises<sup>5</sup>.

This study aims to assess whether the temporary shift to remote classes in the medical course resulted in more free time and motivation for physical activity, and whether the students actually increased or maintained these activities. Another objective was to understand the reasons and contexts associated with physical activity in the moment studied. The start of quarantine on the day determined by the Government of the State of Paraná, which was March 20, 2020, was considered for the evaluation, as each university in Curitiba suspended classes on a different day<sup>6</sup>.

## METHODS AND MATERIALS

This is an analytical cross-sectional study conducted through the application of the self-administered online questionnaire "Engagement in physical activity among medical students during the pandemic caused by SARS-CoV-2". The study was approved by the University Ethics Committee (4,210,170) and followed all ethical guidelines for research with human beings.

Students from all periods of the medical course of a private university in the city of Curitiba-Brazil were invited via WhatsApp to voluntarily answer the online data collection questionnaire. All students who voluntarily agreed to respond to the survey through the online acceptance of the Informed Consent Term and who answered the questionnaire correctly until the end and submitted the answer were included in the study. Students under 18 years old, those not enrolled in the medical course of a university and those who answered the questionnaire incompletely were excluded. Recruitment occurred from August 13th to 25th, 2020.

The questionnaire created by the study organizers was divided into 11 sections. The first section addressed the acceptance of the Informed Consent Term. The next sections included general questions, such as gender, age, period attended in college, presence of any comorbidity (systemic arterial hypertension, dyslipidemia, asthma, diabetes, etc.), as well as the question asking if the remote classes offered more time or willingness to engage in physical activity. Another question asked each student to select the option that best represent them between: "I used to exercise before the pandemic and I continue to", "I used to exercise before the pandemic and I have stopped", "I started to exercise during the pandemic, but I have already stopped", "I started to exercise during the pandemic and I continue to", "I do not exercise".

The instrument also had questions about weight changes during the period analyzed and questions related to adequate space at home for exercising and the influence of social networks as a way of demanding or encouraging exercise and its influence on psychological status.

The results were expressed as frequencies and percentages. The chi-squared test was used to analyze the association analysis between categorical variables. Logistic Regression models were adjusted for the univariate and multivariate analysis of the association between categorical variables and exercise practice. The Wald test was used to assess the significance of each variable. The Odds Ratio was used as estimated measure of association, with a 95% confidence interval. The level of significance was set at p-values less than 0.05. Data were organized in a Microsoft Excel spreadsheet and analyzed with the IBM SPSS Statistics v.20.0. Armonk, NY: IBM Corp computer program.

## RESULTS

Initially, 286 students agreed with the Consent Term and were included in the study. Three participants who were under 18 years old were excluded. As the research target audience was students enrolled in the medical course of the University, those who reported that they were not students of that course and/or university were also excluded from the research. Therefore, 277 participants were included in the follow-up.

Among the respondents, 66.7% were women and most were between 21 and 23 years old (45.1%). Regarding the period in which they were enrolled, 235 (84.8%) participants were enrolled in Pre-clinical or Clinical periods and 42 (15.2%) in the Internship period. The periods were divided this way considering the curriculum established by the University: the pre-clinical period goes from the first period/semester to the third, the clinical period goes from the fourth to the eighth semester and the internship period goes from the ninth to the twelfth semesters, that is, the last two years of medical school.

Regarding comorbidities, 66.1% of the participants did not have any comorbidities. Those that were reported by the others include high blood pressure, dyslipidemia, diabetes, asthma, depression, anxiety and other mental disorders, two or more among the above or some other comorbidity not mentioned.

Regarding physical activity, among the participants, 198 used to exercise before the pandemic, 72 (26.0%)

stopped to exercise during quarantine and only 40 (14.4%) were still exercising when the questionnaire was applied. Meanwhile, 69 reported that they started exercising during the pandemic. Only 10 (3.6%) participants reported that they did not engage in any type of physical activity, either before or during quarantine.

When asked about motivation/free time during remote learning, 54.2% of the participants reported having more motivation/time when taking remote classes in the preclinical, clinical and internship periods. The others reported having less motivation/time in the same situations.

Regarding weight, 39.4% of participants gained weight, 26.7% lost weight, 23.8% maintained their weight and the others did not measure their weight during the period analyzed. Regarding the space for physical activity, 59.2% of the participants reported having adequate space for exercising.

When asked about the influence of social networks on physical activity in the assessed period, 57.8% said they had been influenced by social networks. In addition, almost all participants (91.7%) believe that the social networks affect psychological health.

A univariate analysis of each factor was performed to assess the association between exercising during the pandemic and the factors that were addressed in the questionnaire. The descriptive results of each factor, as well as the estimated values of the Odds Ratio (OR) and respective 95% confidence intervals, are presented in Table 1.

**Table 1.** Univariate analysis of the association between physical activity and factors addressed in the research

Variable	Classification	p*	OR (95% CI)
Age (years)		0.424	1.04 (0.94 - 1.15)
Course period	1st to 3rd (ref.)		
	4th to 8th	0.027	1.87 (1.07 - 3.27)
	9th to 12th	0.106	1.90 (0.87 - 4.14)
Comorbidities	Yes (ref.)		
	No	< 0.001	3.20 (1.91 - 5.36)
Course changes during the pandemic gave me**	Less time to exercise		
	More time to exercise	< 0.001	20.7 (11.0 - 39.1)
Weight***	Gained weight (ref.)		
	Lost/maintained weight	0.017	1.87 (1.12 - 3.13)
Have adequate space at home	No (ref.)		
	Yes	0.008	1.95 (1.19 - 3.18)
Was influenced by social networks to exercise	Yes (ref.)		
	No	0.007	1.98 (1.20 - 3.27)
Social networks affect psychological health	No (ref.)		
	Yes	0.039	2.52 (1.05 - 6.04)

\* Logistic Regression Model and Wald Test  $p < 0.05$

\*\* Have remote classes/do not have normal activities at the internship/have normal activities at the internship

\*\*\* Excluded those who did not measure their weight

It was possible to verify that there was no association between the age of the students and the practice of exercises (OR 1.04 [0.94 – 1.15],  $p = 0.424$ ). It was also possible to note that being a student from the 4th to the 8th period was associated with the practice of exercises during the pandemic when compared to being a student from the 1st to the 3rd period (OR 1.87 [1.07 – 3.27],  $p = 0.027$ ). That association was not present for those enrolled from the 9th to the 12th period.

A relevant association was also found between comorbidities and physical activity: participants without comorbidities exercised more when compared to those with a comorbidity (OR 3.20 [1.91 – 5.36],  $p < 0.001$ ).

Regarding course changes (having remote classes/ not having normal internship activities/having normal internship activities), it was observed that those who had more time/motivation for physical activity actually exercised more (OR 20.7 [11.0 – 39.1],  $p < 0.001$ ).

Weight loss and maintenance were directly and significantly associated with physical activity when compared to weight gain (OR 1.87 [1.12 – 3.13],  $p = 0.017$ ). Out of the 109 participants who reported having gained weight during quarantine, 51.4% practice exercises. On the other hand, out of the 140 who reported losing or maintaining weight in the period, 55.4% exercised.

As the WHO recommended social isolation, exercising at home would require an appropriate space. It was possible to verify that there is, in fact, an association between having an adequate space at home and exercising, when compared to not having an adequate space for physical activity (OR 1.95 [1.19 – 3.18],  $p = 0.008$ ).

It was noted that, among those who reported not being influenced by social networks to exercise, 69.2% actually exercised, while only 53.1% of those who reported being influenced engaged in physical activity. Therefore, those who reported having no influence from social networks were 98% more likely to exercise when compared to those who reported this influence (OR 1.98 [1.20 – 3.27],  $p = 0.007$ ). Also, those who reported that social networks affect psychological status were 2.5 times more likely to exercise when compared to those who did not believe in this association (OR 2.52 [1.05 – 6.04],  $p = 0.039$ ).

The study also analyzed the association between physical activity and monitoring with a health professional. It was possible to notice that 57 students were being monitored by a health professional during the period of social isolation, and only 46 of them were practicing exercises when the questionnaire was applied. Of the 220 who were not being monitored, 120 practiced exercises. The small number of students who follow up with health professionals may be related to the ease of finding the necessary basic knowledge on the Internet and associating it with the knowledge already acquired during the undergraduate medical course. However, the financial issue and its direct influence on the search for professional help was not evaluated in this study.

A Logistic Regression model was adjusted to assess the factors associated with the practice of physical activity, including as explanatory variables those that showed significance in the univariate analysis. The results are shown in Table 2.

**Table 2.** Multivariate analysis of the association between physical activity and factors addressed in the research

Variable	Classification	p*	OR (95% CI)
Course period	1st to 3rd (ref.)		
	4th to 8 <sup>th</sup>	0.638	1.21 (0.55 - 2.69)
	9th to 12th	0.934	0.95 (0.31 - 2.95)
Comorbidities	Yes (ref.)		
	No	0.003	3.04 (1.47 - 6.32)
Course changes during the pandemic gave me**	Less time to exercise		
	More time to exercise	< 0.001	17.7 (8.7 - 36.2)
Weight assessment***	Gained weight (ref.)		
	Lost/maintained weight	0.256	1.49 (0.74 - 2.98)
Have adequate space at home	No (ref.)		
	Yes	0.178	1.67 (0.79 - 3.50)
Social networks affect psychological issues	No (ref.)		
	Yes	0.782	1.19 (0.35 - 4.10)

\* Logistic Regression Model and Wald Test  $p < 0.05$

\*\* Have remote classes/do not have normal activities at the internship/have normal activities at the internship

\*\*\* Excluded those who did not measure their weight

The time spent in physical activity was also evaluated. Among the 198 participants who reported that they used to exercise before the pandemic (regardless of whether they continued the practice or had already stopped at the time of the questionnaire), 19 (9.60%) exercised for less than 1 hour a week, 32 (16.16%) for 1 to 2 hours, 42 (21.21%) for 2 to 3 hours and 105 (53.03%) for more than 3 hours a week. Among the 62 people who started exercising during the pandemic (regardless of whether they stopped it or not), 17 (27.41%) exercised for less than 1 hour a week, 13 (20.96%) for 1 to 2 hours, 16 (25.80%) for 2 to 3 hours and 16 (25.80%) for more than 3 hours a week.

Therefore, only the absence of comorbidities and the greater availability of time to exercise remained as factors that affected its effective practice, as the adjusted model showed compliance in both variables. At the same time, it was found that 149 of the students on remote learning had more time/willingness to exercise, and 130 of them actually did some type of exercise. However, among the 121 participants who reported having less time/willingness to exercise on remote learning, 30 did at least one type of exercise (OR 17.7 [8.7 – 36.2],  $p < 0.001$ ). This may be associated with the fact that students spend less time commuting to activities and have fewer extracurricular activities and classes during this period.

Finally, regarding comorbidities, it was observed that, among the 183 who reported no comorbidities, 127 practiced exercises (OR 3.04 [1.47 – 6.32],  $p = 0.003$ ). On the other hand, among the 94 patients who reported at least one comorbidity, only 39 exercised, that is, they reported that they started exercising during the pandemic and continued to do it (6) or used to exercise before the pandemic and continued to do it (33).

## DISCUSSION

The literature provides information on the benefits and harms of physical activity for medical students. However, studies involving the pandemic scenario caused by SARS-CoV-2, which led to a context of social isolation and closure of gyms, colleges, businesses and companies, are not so easily found.

Frank et al.<sup>7</sup> evaluated medical students from the United States and found that at least 60% of the students complied with the exercise recommendations of the Centers for Disease Control (CDC). However, the number of students who believed that physical activity recommendations would be highly relevant to their clinical practices decreased throughout the periods of the course. The present study found that 232 (78.8%) of the students evaluated used to exercise before the pandemic, corroborating the notion that most students understand the benefits of physical activity and try to put it into practice, despite of their strenuous workload and other influencing factors.

In a study published by Alves et al.<sup>8</sup>, the prevalence of a sedentary lifestyle among evaluated medical students was estimated at 7.4%. In addition, overweight or obesity was noted in 25.7% of students considered active. In the present study, the prevalence of a sedentary lifestyle was 27.3% when evaluating the general scenario before the pandemic. However, when evaluating the current context, it was found that 44% of students have a sedentary lifestyle, including those who do not exercise, those who used to exercise and quitted and those who started to exercise but have already quitted.

According to a study by Rodrigues et al.<sup>9</sup>, medical students presented uncertainties related to their training, which, associated with the pressure and the expectations created due to the delay in their course and extracurricular activities, affected their mental health and, consequently, caused emotional and psychosocial issues. Physical activity is also associated with mental health and with the learning process and can be used as an escape mechanism. During the Covid-19 pandemic, this habit proved to be even more necessary<sup>10,11,12,13</sup>.

Barros et al.<sup>14</sup> conducted a survey in the national territory addressing feelings of depression, anxiety, sadness and nervousness in the population, and found that these feelings, as well as sleep problems, are more prevalent in young adults, women and people with a previous diagnosis of depression. An article called “Getting fat in quarantine”<sup>15</sup> showed that food was used as a tool to deal with negative feelings during quarantine. The present study found that 39.35% of the sample gained weight during this period. Thus, it was possible to see that most medical students managed to maintain or lose weight, probably because since the beginning of college they had greater access and education on healthy lifestyle habits compared to the general population analyzed in these studies.

Still, 91.7% of the participants considered that social networks affect psychological health, which is in line with the findings of Rodgers et al.<sup>16</sup> in an article relating social media to eating disorders. The authors claim that social media exert effects mostly in three ways: the first by exposure to thin ideal- and diet culture-related content as well as food advertising; the second due to the increased use of social media in home-office environments; and the third due to jokes referring to weight gain during the period and social media attention to home cooking and recipes that can create a feeling of greater attention to weight and food. Analyzing these three pathways, it is possible to conclude that the increased use of the internet when working from home can help people find ways to stay healthy, whether consuming healthy food, cooking at home, training, etc. Thus, social networks can have a positive influence, helping users to have a healthier life. However, they should be used with caution, as the excessive use of social networks can lead to eating and psychiatric disorders.

It was found that 69.40% of the individuals who did



not have any comorbidities practiced exercises, that is, more than half of the sample, while in the group of people who had comorbidities only 41.48% did some type of exercise when the questionnaire was applied. It was also noted that those who did not have comorbidities such as asthma, hypertension, diabetes, psychological issues, among others, found it easier to adapt to physical activity and include it in their routine. However, considering that physical activity can be used as a non-pharmacological treatment for these comorbidities, those with a disease should actually be engaging in more physical activity. An article published by Hoffmann et al.<sup>17</sup> evaluated 132 patients with stable heart failure through a questionnaire and found a strong association between fear of physical activity and anxiety, depression and kinesophobia, as well as lack of knowledge.

Even though this study showed the influence of changes in the teaching modalities of the medical course on the practice of exercises among students, some limitations should be pointed out, such as the fact that the sample included only medical students from a single higher education institution and the sampling process was not probabilistic, which led to a discrepancy in the number of respondents from the different periods of the course.

Still, for a more comprehensive study, the analysis should include other barriers for self-care during medical

training in addition to sedentary lifestyle, such as diet, the use of legal and illegal drugs, the use of medications such as antidepressants and anxiolytics and psychological pressure.

## CONCLUSION

Based on the findings of the present study, it can be concluded that having more time and/or motivation for physical activity and not having comorbidities directly and significantly influenced the practice of exercises among medical students who now have remote classes during the COVID-19 pandemic. These two factors were associated with physical activity even when controlled by age, course period, weight change and the influence of social networks, which was individually associated with physical activity, but lost the association in the multivariate analysis.

Understanding the factors that influence the practice of exercises in this population at a critical period of the pandemic may support managers, specifically from the university, in the development of strategies that facilitate and encourage physical activity among academics, with the objective of improving the physical and mental health of students. In addition, the knowledge in this area can help expanding this subject to other undergraduate courses and age groups.

**Author's Participation:** *Maruyama BY* and *Marin MC* elaborated the form applied in the study and conducted the data collection. They subsequently evaluated hypotheses and assessed the data. They read the articles used for the writing of the study, discussed the hypotheses, and wrote the present study. *Pedroni MA* guided the other authors in the writing of the study and assisted them in evaluating the hypotheses and reading articles. Finally, in conjunction, the authors reviewed the study and made the final modifications.

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