COVID-19 and physical activity: increase in inactivity among university students and its health impacts

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Abstract

This study aimed to analyze the occurrence and factors associated with physical inactivity (PI) among university students of health-related programs during the COVID-19 social distancing measures. This cross-sectional study included university students enrolled in health-related programs of the Universidade do Oeste de Santa Catarina (UNOESC) and Universidade Católica de Santa Catarina (Católica SC). Data were collected using a self-applied online questionnaire with demographic and health questions, including the International Physical Activity Questionnaire Short (IPAQ Short) for the assessment of physical activity (PA). Were considered as "active" students that practiced at least moderate PA at least 5 days per week for at least 30 minutes; "insufficiently active" the ones who did not reach this recommendation; and "inactive" the participants that did not practice and PA. Factors associated with PI were calculated using Poisson regression with robust adjustment of variance stratified by sex. A total of 656 students participated in the study. Prevalence of PI was of 54.6%. The significant factors were related to female sex, more advanced age, studying Psychology, time under social distancing, and quality of the eating habits. Among the students that reported practicing PA (45.4%), the majority was considered "insufficiently active" (70.2%). Walking/running was the most prevalent PA (57%), followed by stretching (46.3%), and exercises with weights (39.6%). PI was prevalent among health students, with greater risk observed among students that were female, older, studied Psychology, and reported low-quality eating habits.

Keywords: Exercise; Sedentary behavior; Student health; Students; Health occupations.

Introduction

Physical activity (PA) is acknowledged as an important factor for the promotion of quality of life and health status, having a positive influence in the maintenance of health conditions in general, including cognitive performance and well-being. It can also improve cardiovascular function and help to maintain a healthy body composition[1-3]. PA is or may be present in the commute to work, leisure time, housekeeping chores, among others.

The most significant health benefits are associated with physical exercise, which can be defined as PA guided towards a goal. Benefits include body development, health promotion, and cognitive improvement[4]. For adults aging between 18 to 64 years, at least 150 minutes per week of PA are recommended in order to develop responses capable of granting well-being. Individuals that regularly practice PA have better weight control, reduced chances of developing chronic diseases, better sleep quality, better humor and mental health, improved immune responses and cardiovascular activity, and better regulation of

the homeostasis[4-6].

Despite all the benefits, there is an excess of physical inactivity (PI) worldwide. According to the World Health Organization (WHO), PI is present in one third of the female population and in one fourth of the male population, being this incidence two times higher in high-income countries in relation to low-income countries[5].

PA is considered as low among health students, with prevalence of sedentary behaviors, and it may be related with the prevalent physical and mental weariness resulting from the long hours of study, academic activities, and parallel work routine[7,8]. Considering that the lack of PA is associated with one of the main risk factors for mortality from non-transmissible chronic diseases[5] and that health promotion through healthy behaviors among adults increase the chances of a healthy aging, regular PA can be considered as a highly recommended habit within the context of a healthy lifestyle[1,9].

The outbreak of the COVID-19 pandemic[10] raised the need for restrictive measures concerning the circulation of people, temporary suspension of certain activities and venues, including schools and universities, gyms, public parks, among others, which might have contributed to an increase in PI[11-13].

Considering the importance of PA in the life of university students during the restrictive measures and the risks associated with PI[14,15], this study aimed to analyze the occurrence of PI and factors associated among university students enrolled in health-related programs during the restrictive measures imposed during the COVID-19 pandemic, being hypothesized that social distancing had a negative impact on PA and, consequently, on their overall health.

Method

Sample

This is a cross-sectional study that included university students aging 18 years of more enrolled in health-related programs of the Universidade do Oeste de Santa Catarina (UNOESC) and Universidade Católica de Santa Catarina (Católica SC). Both institutions are community universities located in the state of Santa Catarina. Sample size calculation, considering a population of 4,700 students, with a confidence level of 95% and a heterogenous distribution, resulted in a minimal requirement of 571 students in the study.

Data collection

Data was collected using a self-applied online questionnaire developed in Google Forms. The access link was sent via e-mail in July, August, and September of 2020, when the students did not have face-to-face classes due to the social distancing measures.

The questions were presented after the participants were allowed to read and agree with the free and informed consent form. Links to the questionnaire were sent to the e-mail address of the students during the time of the study. The information collected consisted of university and program where the student was enrolled, age, sex, marital status, work, time in social distancing, and behaviors during this period (daily time using social media; perception on feelings of anxiety, sadness, or concern in comparison to pre-pandemic times; perception on the quality of the eating habits; alcohol consumption).

PA profile was determined using the International Physical Activity Questionnaire Short (IPAQ Short)[16]. Individuals that practiced at least 30 min of moderate or vigorous PA for at least 5 days per week were considered as "active". Participants that practiced PA but not to this threshold were considered as "insufficiently active", and students that did not engage into any PA were considered as "inactive".

Data analysis

Statistical analysis was performed in Stata 13. Following a descriptive analysis, Poisson regression with robust adjustment of variance was performed in order to investigate PI and its association with the independent variables of interest (age, sex, period of time in social distancing, university program, work status), evaluating the prevalence ratios (PR) and their respective confidence intervals at 95% (CI95%). In the adjusted analysis, a three level

hierarchical model was used to adjust for confounding factors. These analyses were stratified for sex, at a significance level of 5%.

This study was approved by the UNOESC Ethics Committee in Research, under the protocol number 4.121.953.

Results

A total of 723 questionnaires were answered, and 67 were excluded because they did not fit the inclusion criteria. Thus, the study had a total of 656 students.

Most participants studied at UNOESC (82.5%) and were female (84.8%). Ages varied between 18 and 57 years (average = 23.8), with most respondents aging between 18 and 23 years (69.7%). Nearly one third of the sample was of psychology students (31.5%), followed by medicine (13.4%), and nursing (11.1%). Considered together, students enrolled in the three programs accounted for 56% of the participants. The vast majority of the participants (97.1%) reported to have practiced social distancing. Of these, 67.2% followed the restrictions for two months or more. During this period, 39.3% accessed social media platforms for 3-4 hours every day, and 18.7% for at least 7 hours. For 83.7% of the participants, there was an increase in self-reported anxiety, sadness, and concern. The quality of the eating habits worsened for 37.4%, while 18.1% considered that there was an improvement. Concerning alcohol consumption, 20.9% reported reduction, whereas there was an increase for 13.9% of the respondents (TABLE 1).

TABLE 1 - Sample characteristics (n=656).

Variable	n	%
Sex		
Female	556	84.8
Male	100	15.2
Age (completed years)		
18 to 19	159	24.2
20 to 21	178	27.1
22 to 23	119	18.1
24 or more	200	30.5
Under graduation or post-graduation program		
Psychology	207	31.5
Medicine	88	13.4
Nursing	73	11.1
Nutrition	41	6.2
Physical Education	39	5.9
Odontology	39	5.9
Physiotherapy	37	5.6
Pharmacy	36	5.5
Biomedicine	33	5.0
Veterinary Medicine	26	4.0
Post-Graduation	25	3.8
Biological Sciences	11	1.7
Cosmetology	1	0.1
Work		
No	342	52.1
Yes	314	47.9

Continue

Continued
TABLE 1 - Sample characteristics (n=656).

Variable	n	%
Adherence to social distancing measures		
Yes. Did not leave home except for essential activities	314	47.9
Yes, partially. Only ceased certain activities	212	32.3
Yes, but had already returned to all regular activities	111	16.9
No, did not practice social distancing in any moment	19	2.9
Time in social distancing		
2 months or more	441	67.2
1 month	76	11.6
Less than 2 weeks	**76**	11.6
More than 2 weeks	63	9.6
Daily time using social medial platforms		
Up to 2 hours	110	16.8
3 to 4 hours	258	39.3
5 to 6 hours	165	25.2
7 hours or more	123	18.7
Increased feeling of anxiety, sadness, or concern in comparison to the pre-pandemic period		
No	107	16.3
Yes	549	83.7
Perceived changes in the quality of the eating habits in comparison to the pre-pandemic period		
Started to eat better	119	18.1
Started to eat worse	245	37.4
No changes	292	44.5
Consumption of alcoholic beverages in comparison to the pre-pandemic period		
Does not consume alcohol	218	33.2
Alcohol consumption increased	91	13.9
Alcohol consumption decreased	137	20.9
No changes	210	32.0
Total	656	100.0

Less than half of the students (45.4%) engaged into PA during social distancing. The most frequent forms of PA were walking or running (57.4%), stretching (46.3%), and exercises with weights (39.5%). Average duration of PA was 52.8 minutes (SD=27.4), 3.5 days per week (SD=1.59). According to the IAPQ, 23.2% (n=211) were considered as insufficiently active, and 13.3% (n=87) as physically active. Inactivity was observed in 54.6% of the participants, as they did not perform any sort of PA (TABLE 2).

TABLE 2 - Physical activity among university students of health programs during the COVID-19 restrictive measures (n=656).

Practice of physical activity during social distancing	**n**	**%**
No	358	54.6
Yes	298	45.4
Type of physical activity (n=298)		
Walking/running	186	57.4
Stretching	150	46.3
Exercises with weights	128	39.5
Gymnastics	64	19.8
Pilates	23	7.1
Others	82	25.3
Days per week and duration of the physical activity (n=298)	**Average**	**SD**
Days per week practicing physical activity	3.5	1.59
Duration, in minutes, of each session	52.8	27.4
Physical activity (IPAQ Short) (n=298)	**n**	**%**
Active - at least 30 min/day of moderate physical activity for at least 5 days per week	87	13.3
Insufficiently active - physical activity below the recommendation	211	32.2
Inactive - no physical activity	358	54.6

Following a adjusted analysis by sex, PI was significant only for female students. Participants aging 24 years or more (PR=1.20; CI95%: 0.98-1.47), studying psychology (PR=1.16; CI95%: 0.98-1.36), and who reported a decrease in the quality of the eating habits (PR=1.20; CI95%: 0.89-1.20) showed a greater risk or probability of being physically inactive. On the other hand, students that reported longer periods of time practicing social distancing showed a lower probability of being physically inactive (PR=0.83; CI95%: 0.71-0.97) (TABLE 3).

TABLE 3 - Raw and adjusted analyses of the factors associated with physical inactivity during the COVID-19 restrictive measures (n=656).

Level	**Variable**	**Female**		**Male**	
		Raw PR(CI95%)	Adjusted PR(CI95%)	Raw PR(CI95%)	Adjusted PR(CI95%)
	Age (completed years)	p=0.042	p=0.050	p=0.534	p=0.396
	18 to 19	1.00	1.00	1.00	1.00
1st	20 to 21	0.93 (0.74-1.17)	0.93 (0.74-1.17)	1.40 (0.62-3.16)	1.39 (0.63-3.06)
	22 to 23	1.17 (0.93-1.46)	1.16 (0.93-1.45)	1.23 (0.49-3.09)	1.16 (0.47-2.85)
	24 or more	1.21 (1.00-1.47)	1.20 (0.98-1.47)	1.67 (0.76-3.60)	1.70 (0.81-3.58)

Continue

Continued

TABLE 3 - Raw and adjusted analyses of the factors associated with physical inactivity during the COVID-19 restrictive measures (n=656).

Level	Variable	Female		Male	
		Raw PR(CI95%)	Adjusted PR(CI95%)	Raw PR(CI95%)	Adjusted PR(CI95%)
1st	**Work**	p=0.555	p=0.876	p=0.332	p=0.210
	No	1.00	1.00	1.00	1.00
	Yes	1.04 (0.90-1.21)	1.01 (0.87-1.18)	0.81 (0.53-1.23)	0.76 (0.50-1.16)
2nd	**University**	p=0.713	p=0.538	p=0.388	p=0.728
	Católica de Santa Catarina	1.00	1.00	1.00	1.00
	Unoesc	0.96 (0.80-1.16)	1.06 (0.87-1.29)	0.80 (0.49-1.32)	0.90 (0.52-1.58)
	Undergraduate or post-graduate program	p=0.053	p=0.056	p=0.747	p=0.855
	Medicine	0.89 (0.68-1.17)	0.88 (0.67-1.15)	1.09 (0.58-2.04)	1.10 (0.58-2.06)
	Nursing	0.93 (0.72-1.21)	0.93 (0.71-1.21)	1.22 (0.29-5.15)	1.23 (0.29-5.20)
	Psychology	1.18 (1.01-1.30)	1.16 (0.98-1.36)	1.38 (0.86-2.23)	1.34 (0.80-2.24)
	Post-graduation	0.77 (0.45-1.33)	0.66 (0.38-1.15)	1.22 (0.51-2.95)	1.23 (0.51-2.98)
	Others	1.00	1.00	1.00	1.00
3rd	**Time practicing social distancing**	p=0.024	p=0.049	p=0.445	p=0.449
	Up to three weeks	1.00	1.00	1.00	1.00
	One month	0.81 (0.62-1.06)	0.84 (0.65-1.08)	1.33 (0.73-2.43)	1.18 (0.62-2.25)
	Two months or more	0.80 (0.68-0.94)	0.83 (0.71-0.97)	0.96 (0.57-1.59)	0.85 (0.51-1.41)
	Daily time using social media platforms	p=0.680	p=0.559	p=0.782	p=0.714
	Up to 2 hours	1.00	1.00	1.00	1.00
	3 to 4 hours	0.90 (0.73-1.10)	0.93 (0.76-1.14)	1.37 (0.67-2.77)	1.31 (0.67-2.54)
	5 to 6 hours	0.89 (0.71-1.11)	0.83 (0.74-1.17)	1.10 (0.47-2.58)	0.94 (0.39-2.28)
	7 hours or more	0.95 (0.75-1.21)	1.07 (0.83-1.38)	1.33 (0.64-2.78)	1.21 (0.59-2.48)
	Feeling more anxiety, sadness, or concern in comparison to the pre-pandemic period	p=0.181	p=0.121	p=0.708	p=0.976
	No	1.00	1.00	1.00	1.00
	Yes	1.17 (0.93-1.48)	1.20 (0.95-1.50)	1.11 (0.65-1.87)	1.01 (0.55-1.85)
	Perception on the quality of the eating habits in comparison to the pre-pandemic period	p=0.011	p=0.027	p=0.127	p=0.149
	No changes	1.00	1.00	1.00	1.00
	Started eating better	0.69 (0.53-0.89)	0.72 (0.56-0.94)	0.60 (0.27-1.34)	0.58 (0.26-1.29)
	Started eating worse	1.02 (0.88-1.19)	1.20 (0.89-1.20)	1.30 (0.86-1.97)	1.30 (0.83-2.04)

Continue

Continued

TABLE 3 - Raw and adjusted analyses of the factors associated with physical inactivity during the COVID-19 restrictive measures (n=656)

Level	Variable	Female		Male	
		Raw PR(CI95%)	Adjusted PR(CI95%)	Raw PR(CI95%)	Adjusted PR(CI95%)
3rd	**Consumption of alcoholic drinks in comparison to the pre-pandemic period**	p=0.277	p=0.429	p=0.729	p=0.567
	Does not consume alcohol	1.00	1.00	1.00	1.00
	No changes	1.11 (0.93-1.34)	1.08 (0.90-1.30)	1.03 (0.63-1.68)	0.98 (0.60-1.62)
	Consumption increased	1.19 (0.96-1.48)	1.13 (0.92-1.40)	1.00 (0.49-2.04)	1.03 (0.52-2.04)
	Consumption decreased	0.98 (0.78-1.23)	0.95 (0.76-1.19)	0.74 (0.40-1.36)	0.68 (0.38-1.22)
	Sleep-related problems developed during the pandemic	p=0.961	p=0.728	p=0.575	p=0.939
	Yes	1.00	1.00	1.00	1.00
	No	1.00 (0.84-1.21)	0.97 (0.80-1.16)	1.16 (0.69-1.92)	1.02 (0.63-1.65)

P value from Wald's heterogeneity test.

Discussion

The benefits of regular PA can be perceived in many aspects, including social, physiological, psychological, and cognitive[17]. Regular PA is fundamental for the prevention of some important non-transmissible chronic disease and for the promotion of an active and healthy aging process[18].

The restrictive measures adopted during the COVID-19 pandemic restricted access to collective sports, outdoors activities, and gyms, which limited PA levels and increased risk for sedentary behaviors. Studies were developed highlighting the importance and presenting guidance and strategies to remain active during social distancing[19-22], but evidence shows that it was not enough, as a national online study with the general population revealed that PA was negatively affected during the period[23]. The same effect was also observed in other countries[11,24].

In our study, a little more than one tenth of the students (13.3%) were considered as physically active. Walking or running, stretching, and exercises with weights were the most prevalent types of PA. Despite the low percentage of physically active students in our sample, it was higher than what was observed in Canada (9.6%) in the same period[11]. Other studies also showed similar reductions in PA during the restrictive measures[23,25]. These results represent an alert towards the health of the students, and the imminent need for interventions aimed to stimulate PA in this population.

The high prevalence of PI identified among the students included in our research (54.6%) is concerning in what refers to the potential health risks of sedentarism. In a study with the Chilean population prior to the COVID-19 pandemic, it was observed that one in each three adults presented PI[26], and in the Brazilian population, 88% of the adults did not fulfill the international guidelines for PA, and PI was observed to increase in 26% during the pandemic[27]. Spanish students, on the other hand, increased the number of days and the duration of PA during the pandemic, but the time spent sitting down also increased, as they spent more time at home[28].

The reduced adherence of students to PA during the COVID-19 pandemic make this population more vulnerable to health problems. PI is an important risk factor to the development of chronic diseases18. However, even though seemingly contradictory, more time spent at home due to social distancing protected against PI. It is arguable that, as our sample was composed of health sciences students and therefore

knowledgeable about healthy habits and health promotion, the ones that already were physically active benefited from the time at home practicing social distancing, dedicating it to perform PA.

More time spent at home favored sedentary behaviors. Almost half of the students reported a daily use of social media platforms of 5 hours or more (43.9%). These behavioral characteristics can be seen as effects of the pandemic, as people had to adapt their lifestyle to the new conditions. A retrospective online study with 39,639 Brazilian adults on the prevalence of PI and sedentary behavior during the pandemic gave more evidence on its effects on sedentarism[27]. The study showed that activities performed in front of a screen (smartphones, tablets, computers, TV) increased significantly, with an increase of 266% for TV and 38% for computers and tablets. These behaviors, characteristic of sedentary lifestyles, were also favored by online classes, that increased the time spent sitting down in front of a screen[15]. Despite that, time spent interacting with social media platforms was not a risk factor for PI during social distancing, even though it deserves attention.

Occurrence of feelings of anxiety, sadness, or concern had a significant increase during social distancing, being reported by 83.7% of the participants. Numerous studies showed that COVID-19 had a negative impact on the mental health of university students[29-31] and PA is a relevant strategy to counteract these effects. Studies found that PA can not only prevent mental health problems but can also be an effective therapy[24,32,33]. Considering the high level of PI in our sample (54.6%), increase in anxiety, sadness, or concern was not attributed to risk association, but the inverse seems more likely.

Age, undergraduate or post-gradation program, time in social distancing, and quality of the eating habits were associated with PI during social distancing among the female participants. In a transversal study with university students in Egypt, Libya, and Palestine on healthy behaviors, such as PA and healthy nutrition, it was observed that women showed more limited conditions for physically active conditions in comparison to men[9]. This was not observed among Italian university students, where women had sufficient PA levels[25]. However, it is important to highlight that the male participation in our study was low (15.2%), and the results could have been different with a more equal proportion between sexes. Another point to consider are the variables that favor PA for each sex, as different motivational and environmental factors may exert an influence[28].

Risk for PI was increased with age, as participants aging 24 years or more had 1.2 times the risk of having sedentary behaviors. This observation is in accordance to what was found in a work including Italian students from three universities (n=1,430), where aging less than 22 years favored reaching the minimal recommendations for a physically active lifestyle[25].

Being a student of Psychology, Medicine, Nursing, or Post-Graduation was associated with PI during the pandemic. Psychology students were more prone to PI, while studying Post-Graduation, Medicine, or Nursing protected against PI. Psychology students, however, were one third of our sample, and further research is required to confirm and better understand this finding.

For more than half of the participants (55.5%), the eating habits changed during the pandemic. Among these, most (67.3%) considered that their eating habits worsened in the period. This finding is in accordance with previous reports[11,23,24]. In our work, students that reported a reduction in the quality of their eating behavior (increased intake of food rich in calories, fat, or sugar, artificial or frozen food, etc.) had 20% more risk to PI, whereas eating more fruits, vegetables, and meals prepared at home protected against PI. Even though it was not directly analyzed in our research, it is possible to suggest that students that remained physically active during social distancing showed a tendency to have healthier eating habits.

The pandemic period did not impact alcohol consumption in our sample. This is in accordance with other studies with university students[34,35]. However, this still is an important issue to consider, as this was not always the case[11] and mainly affected students with poorer mental health[36]. The fact that our sample consisted only of health students might provide one of the possible explanations why an increase in alcohol intake was not observed.

Despite the relevance of the topic and of our findings and their implications, it is not possible to stablish causal relations among the outcomes. Also, as the questionnaires were self-applied and the responses are subjective, it is not possible to discard the possibility of biases in the responses, as the participants may have forgotten or omitted information regarding their past or present habits.

PI was prevalent among university students of health programs during the COVID-19 restrictive measures. The main types of PA among physically active and insufficiently active participants were walking/running, stretching, and exercises with

weights. PI was more prevalent among participants that were female, studying Psychology, were older, and decreased the quality of their eating behaviors during the pandemic. More time spent at home, studying in post-graduation programs, Medicine, or Nursing, and improving the eating habits during the pandemic were considered as protecting factors for PI. This study provided more evidence that even though PA is widely regarded as an important factor for the promotion of good health, it is relatively low among health students and was negatively affected during the pandemic, highlighting the importance of stimulating PA in this population, also developing and promoting alternative strategies for adverse times.

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Conflict of interest

There are no conflicts of interest.

Resumo

COVID-19 e atividade física: aumento da inatividade entre estudantes universitários e impactos na saúde.

Este estudo objetivou analisar a ocorrência e fatores associados com inatividade física entre estudantes universitários de áreas de saúde durante as medidas restritivas da pandemia de COVID-19. Este estudo transversal incluiu estudantes universitários de áreas da saúde da Universidade do Oeste de Santa Catarina (UNOESC) e Universidade Católica de Santa Catarina (Católica SC). Os dados foram coletados utilizando um questionário online auto-aplicado com questões demográficas e de saúde, incluindo o International Physical Activity Questionnaire Short (IPAQ Short) para atividade física. Foram considerados "ativos" os estudantes que praticaram atividade física ao menos moderada por ao menos 5 dias por semana por ao menos 30 minutos; "insuficientemente ativos" aqueles que não alcançaram essa recomendação; e "inativos" os que não praticaram nenhuma atividade física. Fatores associados com inatividade física foram calculados utilizando regressão de Poisson com ajuste robusto de variância estratificado por sexo. Um total de 656 estudantes participaram do estudo. A prevalência de inatividade física foi de 54,6%. Os fatores significativos foram sexo feminine, idade mais avançada, estudar psicologia, tempo em distanciamento social e qualidade da alimentação. Entre os estudantes que reportaram praticar atividade física (45,4%), a maioria foi considerada "insuficientemente ativa" (70,2%). Caminhar/corer foi a atividade física mais prevalente (57%), seguida de alongamento (46,3%) e exercícios com pesos (39,6%). Inatividade física foi prevalente entre estudantes da saúde, com maior risco entre mulheres, com mais idade, estudantes de psicologia e com alimentação de menor qualidade.

Palavras-chave: Exercício físico; Comportamento sedentário; Estudantes de Ciências da Saúde.

References

1. Akram M, Ghous M, Tariq I, Khan H, Paracha M, Hussain B. The association between physical activity with cognitive and cardiovascular deconditioning in age related decline of college students. J Pak Med Assoc. 2018; 68(12): 1755-8.
2. Arigo D, Rohde P, Shaw H, Stice E. Psychosocial predictors of physical activity change among college students in an obesity prevention trial. J Phys Act Health. 2017;14(7):513-9.
3. Fisher JJ, Kaitelidou D, Samoutis G. Happiness and physical activity levels of first year medical students studying in Cyprus: a cross-sectional survey. BMC Med Educ. 2019; 19(1):475.
4. Brasil. Guia de atividade física para a população brasileira. 1st ed. Brasília: Ministério da Saúde; 2021. p. 54.
5. WHO. Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva: World Health Organization; 2018. p. 101.
6. Neves AW, Santana MG, Silva KH, Passos GS. Efeito da (in)atividade física nas queixas de insônia, humor e qualidade de vida de pacientes com hipertensão arterial. Rev Bras Educ Fís Esporte. 2020; 34(3):385-93.
7. Jesus CF, Oliveira RR, Badaró AC, Ferreira EF. Nível de atividade física de estudantes da área da saúde de uma instituição superior particular de Ubá-MG. Rev Bras Prescr Fisiol Exerc. 2017;11(68):565-73.
8. Mendes MLM, Silva FR, Messia CMBO, Carvalho PGS, Silva TFA. Hábitos alimentares e atividade física de universitários da área de saúde do município de Petrolina-PE. Tempus – Actas de Saúde Coletiva. 2016;10(2): 205-217.
9. El Ansari W, Berg-Beckhoff G. Country and gender-specific achievement of healthy nutrition and physical activity guidelines: latent class analysis of 6266 university students in Egypt, Libya, and Palestine. Nutrients. 2017; 9(7):E738.
10. WHO. Director-General's opening remarks at the media briefing on COVID-19. 2020.
11. Bertrand L, Shaw KA, Ko J, Deprez D, Chilibeck PD, Zello GA. The impact of the coronavirus disease 2019 (COVID-19) pandemic on university students' dietary intake, physical activity, and sedentary behaviour. Appl Physiol Nutr Metab. 2021; 46(3):265-72.
12. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet. 2020; 395(10227):912-20.
13. Silva LLS, Lima AFR, Polli DA, Razia PFS, Pavão LFA, Cavalcanti MAFH, et al. Social distancing measures in the fight against COVID-19 in Brazil: description and epidemiological analysis by state. Cad Saude Publica. 2020; 36(9): e00185020.
14. Deng CH, Wang JQ, Zhu LM, Liu HW, Guo Y, Peng XH, et al. Association of web-based physical education with mental health of college students in wuhan during the COVID-19 outbreak: cross-sectional survey study. J Med Internet Res. 2020;22(10):e21301.
15. Rodríguez-Larrad A, Mañas A, Labayen I, González-Gross M, Espin A, Aznar S, et al. Impact of COVID-19 confinement on physical activity and sedentary behaviour in Spanish university students: role of gender. Int J Environ Res Public Health. 2021;18(2):E369.
16. Matsudo S, Araújo T, Matsudo V, Andrade D, Andrade E, Oliveira LC, et al. Questionário Internacional De Atividade Física (IPAQ): estudo de validade e reprodutibilidade no Brasil. Rev Bras Ativ Fís Saúde. 2001;6(2):5-18.
17. Neto JCS, Oliveira FMC, Catunda PPJ, Martins LM, Rocha AM. Processos de plasticidades na aprendizagem do cérebro humano e sua relação com atividade física. Rev Motri Saúde. 2019;1(1).
18. Moreira MM, Ikegami EM, Mesquita IMR, Amaro EA, Pena VV, Meneguci J, et al. Impacto da inatividade física nos custos de internações hospitalares para doenças crônicas no Sistema Único de Saúde. Arquivos de Ciências do Esporte. 2017; 5(1):16-9.
19. Hammami A, Harrabi B, Mohr M, Krustrup P. Physical activity and coronavirus disease 2019 (COVID-19): specific recommendations for home-based physical training. Managing Sport and Leisure. 2020; 0(0):1-6.
20. Peçanha T, Goessler KF, Roschel H, Gualano B. Social isolation during the COVID-19 pandemic can increase physical inactivity and the global burden of cardiovascular disease. Am J Physiol Heart Circ Physiol. 2020; 318(6):H1441-6.
21. Souza Filho BAB, Tritany ÉF. COVID-19: importância das novas tecnologias para a prática de atividades físicas como estratégia de saúde pública. Cad Saúde Pública. 2020; 36(5):e00054420.
22. Alberti A, Soares BH, Grigollo LR, Pasqualotti A, Traebert E, Comim CM, et al. Prática de atividade física em tempos de pandemia do novo COVID-19: seus benefícios e cuidados: Körperliche Aktivität und COVID-19. Rev Bras Educ Fís Esporte. 2021; 35(2):375-80.
23. Ammar A, Brach M, Trabelsi K, Chtourou H, Boukhris O, Masmoudi L, et al. Effects of COVID-19 home confinement on eating behaviour and physical activity: results of the ECLB-COVID19 international online

survey. Nutrients. 2020; 12(6):E1583.
24. Gallo LA, Gallo TF, Young SL, Moritz KM, Akison LK. The impact of isolation measures due to COVID-19 on energy intake and physical activity levels in Australian university students. Nutrients. 2020; 12(6):E1865.
25. Gallè F, Sabella EA, Ferracuti S, Giglio O, Caggiano G, Protano C, et al. Sedentary behaviors and physical activity of Italian undergraduate students during lockdown at the time of COVID-19 pandemic. Int J Environ Res Public Health. 2020; 17(17):E6171.
26. Fernández-Verdejo R, Suárez-Reyes M. Inactividad física versus sedentarismo: análisis de la Encuesta Nacional de Salud de Chile 2016-2017. Rev Méd Chile. 2021; 149(1):103-9.
27. Silva DRP, Werneck AO, Malta DC, Souza Júnior PRB, Azevedo LO, Barros MBA, et al. Changes in the prevalence of physical inactivity and sedentary behavior during COVID-19 pandemic: a survey with 39,693 Brazilian adults. Cad Saude Publica. 2021; 37(3): e00221920.
28. Romero-Blanco C, Rodríguez-Almagro J, Onieva-Zafra MD, Parra-Fernández ML, Prado-Laguna MDC, Hernández-Martínez A. Physical activity and sedentary lifestyle in university students: changes during confinement due to the COVID-19 pandemic. Int J Environ Res Public Health. 2020; 17(18):E6567.
29. Bashir TF, Hassan S, Maqsood A, Khan ZA, Issrani R, Ahmed N, et al. The psychological impact analysis of novel COVID-19 pandemic in health sciences students: a global survey. Eur J Dent. 2020; 14(1): S91-6.
30. Courtier N, Brown P, Mundy L, Pope E, Chivers E, Williamson K. Expectations of therapeutic radiography students in Wales about transitioning to practice during the COVID-19 pandemic as registrants on the HCPC temporary register. Radiography (Lond). 2021; 27(2):316-21.
31. Eweida RS, Rashwan ZI, Desoky GM, Khonji LM. Mental strain and changes in psychological health hub among intern-nursing students at pediatric and medical-surgical units amid ambience of COVID-19 pandemic: a comprehensive survey. Nurse Educ Pract. 2020; 49:102915.
32. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Br J Sports Med. 2020; 54(24):1451-62.
33. Zhang Y, Zhang H, Ma X, Di Q. Mental health problems during the COVID-19 pandemics and the mitigation effects of exercise: a longitudinal study of college students in China. Int J Environ Res Public Health. 2020; 17(10): E3722.
34. Graupensperger S, Jaffe AE, Fleming CNB, Kilmer JR, Lee CM, Larimer ME. Changes in college student alcohol use during the COVID-19 pandemic: are perceived drinking norms still relevant? emerging adulthood. 2021; 9(5):531-40.
35. Jaffe AE, Kumar SA, Ramirez JJ, DiLillo D. Is the COVID-19 pandemic a high-risk period for college student alcohol use? A comparison of three spring semesters. Alcoholism: clinical and experimental r esearch. 2021; 45(4):854-63.
36. Coakley KE, Lardier DT, Holladay KR, Amorim FT, Mechler H, Zuhl MN. Mental health severity is associated with increases in alcohol consumption in young adult students during the COVID-19 pandemic. Alcoholism Treatment Quarterly. 2021; 39(3):328-41.

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