

## Physical activity levels of Portuguese adolescents in the first period of confinement due to the COVID-19 pandemic and the first activities of teachers and coaches: a cross-sectional study

### Niveles de actividad física de adolescentes portugueses en el primer periodo de confinamiento por la pandemia de COVID-19 y las primeras actividades de profesores y entrenadores: un estudio transversal Níveis de atividade física de adolescentes portugueses no primeiro período de confinamento devido à pandemia de COVID-19 e as primeiras atividades de professores e treinadores: um estudo transversal

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**Abstract.** Due to the COVID-19 pandemic, social confinement was declared in Portugal on 19<sup>th</sup> March 2020. Schools and sports clubs were closed, access to all sports and leisure facilities was limited, and young people have experienced restrictions regarding the practice of physical activities and sports. The purpose of this study was to identify the physical activity (PA) levels and sports participation of adolescents before and during confinement, with whom they practice during restrictions and to identify the activities adopted by their physical education (PE) teachers and sports coaches to keep them physically active. An online survey was conducted between March 27<sup>th</sup> and April 14<sup>th</sup> 2020. A total of 3,012 Portuguese adolescents (57% females) aged between 10 and 19 years old ( $14.3 \pm 2.4$  years old) took part in this study. Wilcoxon test and paired-sample t-test and chi-square test of independence were used in the data analysis. The results show that the number of students engaged in PA increased during the lockdown (72.7% to 88.2%). For those who practiced PA before lockdown, the frequency of PA decreased from 4.7 sessions/week to 4.4 sessions/week (during confinement). For those who did not practice PA before confinement, they started by doing 4.1 sessions/week. The vast majority of PE teachers (77.3%) proposed some pedagogical activities such as video conference classes (53.6%). Regarding the coaches, 53.4% proposed some activity, mainly time circuit training, walking and cycling (around 18% each), or specific training exercises and video conference classes (about 12% each). The number of students who increased their regular PA practice can be justified by the immediate intervention of PE teachers, who implemented several online activities, or because students were able to choose different options to stay active.

**Keywords:** physical education, physical activity, sport, teachers, coaches, COVID-19

**Resumen.** Debido a la pandemia de COVID-19, el confinamiento social se declaró en Portugal el 19 de marzo de 2020. Las escuelas y clubes deportivos fueron cerrados, el acceso a todas las instalaciones deportivas y de ocio fue limitado y los jóvenes experimentaron restricciones en cuanto a la práctica de actividades físicas y deportivas. El objetivo de este estudio fue identificar los niveles de actividad física (AF) y la participación deportiva de los adolescentes antes y durante el confinamiento, con quien realizaron AF durante el periodo de confinamiento e identificar las actividades adoptadas por sus profesores de educación física (EF) y entrenadores deportivos para mantenerlos físicamente activos. Se realizó una encuesta en línea entre el 27 de marzo y el 14 de abril de 2020. Participaron en este estudio un total de 3.012 adolescentes portugueses (57% mujeres) de entre 10 y 19 años ( $14,3 \pm 2,4$  años). En el análisis de datos se utilizaron la prueba de Wilcoxon y la prueba t de muestras pareadas y la prueba de independencia de chi-cuadrado. Los resultados muestran que el número de estudiantes que practicaban AF aumentó durante el confinamiento (72,7 % a 88,2 %). Para quienes practicaban AF antes del confinamiento, la frecuencia de AF disminuyó de 4,7 sesiones/semana a 4,4 sesiones/semana (durante el confinamiento). Para los que no practicaban AF antes del confinamiento, empezaron haciendo 4,1 sesiones/semana. La gran mayoría del profesorado de EF (77,3%) proponía alguna actividad pedagógica como las clases por videoconferencia (53,6%). En cuanto a los entrenadores, el 53,4% propuso alguna actividad, principalmente entrenamiento en circuito, marcha y ciclismo (alrededor del 18% cada uno), o ejercicios de entrenamiento específico y clases por videoconferencia (alrededor del 12% cada uno). El número de alumnos que aumentó su práctica regular de AF puede justificarse por la intervención inmediata de los profesores de EF, que implementaron varias actividades en línea, o porque los alumnos pudieron elegir diferentes opciones para mantenerse activos.

**Palabras clave:** educación física, actividad física, deporte, profesores, entrenadores, COVID-19

**Abstracto.** Devido à pandemia COVID-19, o confinamento social foi declarado em Portugal a 19 de Março de 2020. As escolas e os clubes desportivos encerraram, o acesso a todas as instalações desportivas e de lazer foi limitado, e os jovens sofreram restrições no que diz respeito à prática de atividades físicas e desportivas. O objetivo deste estudo foi identificar os níveis de atividade física (AF) e de participação desportiva dos adolescentes antes e durante o confinamento, com quem realizaram AF e identificar as atividades adotadas pelos professores de educação física (EF) e treinadores no sentido de os manter fisicamente ativos. Foi aplicado um questionário on-line entre 27 de Março e 14 de Abril de 2020. Participaram neste estudo um total de 3.012 adolescentes portugueses (57% raparigas) com idades entre os 10 e 19 anos ( $14,3 \pm 2,4$  anos). Na análise dos dados foram utilizados o teste Wilcoxon, teste t e Qui-quadrado. Os resultados mostram que o número de estudantes envolvidos em AF aumentou durante o confinamento (72,7% a 88,2%). Para aqueles que praticaram AF antes do confinamento, a frequência de AF diminuiu de 4,7 sessões/semana para 4,4 sessões/semana (durante o confinamento). Para aqueles que não praticavam AF antes do confinamento, começaram por fazer 4,1 sessões/semana. A grande maioria dos professores (77,3%) propôs algumas atividades pedagógicas, tais como aulas de videoconferência (53,6%). Relativamente aos treinadores, 53,4% propuseram atividades, como o treino em circuito, caminhada e ciclismo (18%), ou exercícios de treino específicos e aulas de videoconferência (12%). O número de estudantes que aumentaram a prática regular de AF pode ser justificado pela intervenção imediata de professores de EF, que implementaram várias atividades online, ou porque os estudantes puderam escolher diferentes opções para se manterem ativos.

**Palavras chave:** educação física, atividade física, desporto, professores, treinadores, COVID-19

Fecha recepción: 23-03-22. Fecha de aceptación: 25-11-22

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## Introduction

The World Health Organization (WHO) has announced that coronavirus disease (COVID-19) is an international public health emergency. Worldwide, this virus

has already made a social, economic, and physical negative impact on millions of people (Nicola et al., 2020). COVID-19 has forced countries globally to take immediate and protective measures, such as reducing social contacts. On 19 March 2020, the Portuguese Government declared the first confinement. Consequently, all outdoor

activities were limited, and people staying at home was the solution the Government found to reduce people's exposure to the virus.

The lockdown had negative consequences and increased sedentary behaviors, such as being deskbound, doing mainly school homework, or lying down during screening activities (e.g., watching television, interacting on different social networks), which led to a decrease in regular physical activity (PA) (DGS, 2020; Rundle, Park, Herbstman, Kinsey, & Wang, 2020). However, the most important thing was the increase of social inequality as it prevented children from having access to presential school activities and thus being able to develop a wide range of skills. Consequently, COVID-19 strengthened physical inactivity and sedentariness due to the lack of PA opportunities, as emerging evidence on the topic highlights (Howley, 2021; Thompson, Rodebaugh, Bessaha, & Sabbath, 2020; UNESCO, 2021b). Several researchers found negative impacts of COVID-19 on children's PA, especially among those who lived in urban areas and in small apartments (Pietrobelli et al., 2020; Pombo, Luz, Rodrigues, Ferreira, & Cordovil, 2020; Rundle et al., 2020). Yet, in Germany, the main effect of confinement was that children were daily more than 60 min active during a normal week, representing an increase of 0.44 days per week. They also found that children between 4 and 5 years old increased their PA by 0.76 days per week, and adolescents between 14 and 17 increased their PA by 0.26 days per week. This means an 11.1% overall increase during confinement (Schmidt et al., 2020).

Data on the levels of PA obtained from the Portuguese Report Survey (Mota, Santos, Coelho, Raimundo, & Sardinha, 2018) before the COVID-19 pandemics shows that only 34% of boys and 17% of girls aged between 11 to 15 years old, and 4% of students between 16 to 17 of age, achieved PA guidelines. However, 20% of children and young people between 10 to 18 mentioned watching TV more than 4 hours per day on weekdays and 47% during weekends. This reflects sedentary behavior.

It's recognize that Schools and sports clubs are important contexts to foster health and well-being for all children's and adolescents once they can develop peer norms and social-emotional skills (WHO & UNESCO, 2021). In Portugal, PE is in the school curriculum during 12 years (i.e., The first cycle for children from 6-9 years. The second and third cycles of education (10-11years; 12-14 years) and secondary level (15-17 years). In second and third cycles and in secondary, PE typically has 3 hours allocated to the curriculum, two times a week. Once schools, PE and sport clubs contexts are recognized to provide young people with opportunities to develop their skills, knowledge, and healthy lifestyles (Howells, 2019; Sallis & McKenzie, 1991; UNESCO, 2021c), it is important to know the Portuguese adolescents' PA levels during the first confinement COVID-19 pandemic period as well as finding out PE teachers and sport coaches' activities to provide and maintain healthy lifestyles, and

therefore if these activities were put into practice while everyone was at home.

In this singular context where children and adolescents were isolated at home with their families and contacted with colleagues and friends by digital means, there is a need to understand how those type of social relationships were related to their physical activities. There is some evidence (Khan, 2020; Mendonça, Cheng, Mélo, & de Farias Júnior, 2014) that there is a consistent and positive association between the providing of social support by parents (e.g., father, mother, and siblings), and friends, and more engagement adolescents in PA (Khan, 2020; Pluta, 2021). Consequently, those with more support and engagement in activities with relatives or friends had higher levels of PA (Khan, 2020). These social groups may have significantly impacted adolescents in a way that helped them promote more health-related behaviors, such as PA, and improve interpersonal relationships between family and friends (Khan, 2020; Pluta, 2021).

Accordingly to WHO recommendations for PA, it is important to identify the pedagogical activities teachers and coaches adopted early to help young people maintain their levels of PA. Unexpectedly, teachers and coaches had to be very creative to support and motivate their students and athletes to engage in PA, despite not being physically present (Coulter et al., 2021). Teachers and coaches were relatively unprepared for digital teaching, such as home workout activities, video conferences, or outdoor safety activities (Hammami, Harrabi, Mohr, & Krustup, 2020). Online PE teaching and online coaching were the instant solutions. Social media (Lupton, 2015; Rich & Miah, 2017) was a significant source for establishing networks, linking students, and keeping teachers and coaches connected to their mission, despite some researchers suggesting that the use of these digital technologies can have either a negative impact on health (Goodyear, Kerner, & Quennerstedt, 2019; Hausmann, Touloumtzis, White, Colbert, & Gooding, 2017; Third, 2017). However some studies show evidence that digital technologies can have very positive benefits related to peer/social/emotional support, better interaction, accessibility to health information (Shaw, Gomes, Polotskaia, & Jankowska, 2015) motivation (Pyle & Esslinger, 2014), commitment (Goodyear et al., 2019), increase students' cognitive understanding (Palao, Hastie, Cruz, & Ortega, 2015), support assessment (Penney, Jones, Newhouse, & Cambell, 2012), and help in learning and performing motor skills (O'Loughlin, Chróinín, & O'Grady, 2013; Palao et al., 2015).

Some studies report some barriers to teachers' use of technology. Those challenges are related to the nature of the classes (Kretschmann, 2015), lack of time to learn how to use technology, plan and how to incorporate it into their classes or practices (Legrain, 2015) physical space (Palao et al., 2015; Villalba, González-Rivera, & Díaz-Pulido, 2017), teacher knowledge and resistance to change (Kretschmann, 2015), lack of technical and eco-

conomic provision (Orlando, 2014) resources, access and mobility (Palao et al., 2015). However, nowadays the use of digital technology solutions in their daily activities at school is generalized, such as using e-mail, personal computers, tablets, pedometers, mobile phones (Zhu, 2016) mobile applications (Pyle & Esslinger, 2014), and support assessment (Penney et al., 2012).

Considering the problematic exposed above, the specific purposes of the present study were twofold: (i) to investigate the adolescent's PA levels during the first period of confinement (ii) with whom did they practice PA, (iii) to analyze the immediate activities that PE teachers and coaches have developed to make students engage in PA.

## Materials and Methods

### Data collection

Data collection occurred immediately after the confinement, between March 27<sup>th</sup> and April 14<sup>th</sup> of 2020. This point in time represents the second, third and fourth week period after the first confinement has been declared in Portugal. Due to physical restrictions, teachers and coaches were contacted to disseminate the online survey build on a google form plataform. The survey was also randomly released online (i.e., Facebook, WhatsApp, e-mail) to reach as many people as possible (snowball sampling strategy).

The survey did not collect any personal data (name,

birth date, and contact information) to enable the respondent's identification. The first section of the survey presented the study's objectives and addressed the parents' consent to their children's participation. All participants could leave the survey at any stage before the submission process. Only surveys with completed mandatory questions were taken into account for further analysis. Lusófona University's ethics committee approved the questionnaire.

### Survey

The survey was created for this context. To collect data from students' were "measured" using a list of activities selected from Pieron et al. (1997). Studies using this questionnaire with a Portuguese population were published previously (Santos, Escucas, & Mota, 2004), as well as were the validation procedures (Piéron et al., 1997), considered *before* and *during* lockdown (table 1). The survey was composed of 21 questions, representing three dimensions: (i) sociodemographic variables (e.g., age, sex, academic level); (ii) adolescent's habits (e.g., PA before and during confinement, frequency, volume of PA, and with whom); and (iii) teachers and coaches' pedagogical activities (e.g., video conferences, classes, circuit training, walking & cycling, and written work). Before the application, the survey was applied to a group of 20 students to assess the degree of understanding of the questions. From the preliminary analysis of that application, it was clear that the students clearly understood what was being asked.

Table 1.  
Survey criteria

Variable	Questions	Answers	Validation
Adolescent's habits	During social isolation do you practice any type of physical activity / training?	yes, no	
	How many times during a week do you practice any type of physical activity / training?	None to more than seven times a week	(Pieron, 1997)
	What is the duration of your physical activity or training sessions?	Up to 30 min; 1h; 1.5h; 2h or more	
	In a situation of social isolation, with whom do you perform physical activity / training?	Alone; family; friends; coach & teammates	Made for this purpose and validated
Teachers and coaches' pedagogical strategies	Before social isolation, did you practice any sport or physical activity outside of school?	yes, no	
	How many times did you practice any type of physical activity / training per week?	None to more than seven times a week	(Pieron, 1997)
	How long did you perform physical activity / training per day?	Up to 30 min; 1h; 1.5h; 2h or more	
	During the period of social isolation, did your Physical Education Teacher send you any proposals for activities / training to do at home?	yes, no	
Teachers and coaches' pedagogical strategies	What kind of activities did your Physical Education teachers propose to you?	video conferences; circuit training, walking & cycling; written work.	Made for this purpose and validated
	During the period of social isolation, did your coaches recommend any type of activity / training for you to perform at home?	yes, no	
	What types of activities / training did your coaches propose to you?	video conferences classes, circuit training, walking & cycling, written work.	

### Participants

A total of 3,045 answers were collect. After cleaning the data (e.g., wrong information, age, academic level, and missing values), 3,012 students, 1,707 girls (57%) and 1,305 boys (43.0%), between 10 and 19 years old (14.3±2.4 years old) were included in this investigation.

### Statistics

Statistical analysis was performed using IBM SPSS Statistics version 24. Descriptive statistics as frequency and percentages were reported. The Chi-Square test was used for testing relationships between categorical variables (e.g., sex and the practice of

PA – Yes or No; sex and the person with whom students practiced PA). A paired-sample t-test was used to compare the average of the frequency of PA (number of times per week) before and during isolation. The Wilcoxon test was applied to compare the volume of PA (Up to 30m; 1 hour; 1,5 hours; 2 hours or more) before and during isolation. To compare the mean age across multiple categories of other variables (e.g., “person with whom the student practices PA” or “activities proposed by the teachers”), ANOVA cannot be used since there was no homogeneity of variances and the groups were very unbalanced. Therefore, a Kruskal-Wallis test was performed. Significance level was set for  $p < .05$ .

### Results

Descriptive results about the three dimensions (e.g., sociodemographic variables, adolescents’ habits, and teachers’ and coaches’ pedagogical activities) are presented in table 2. This table shows that girls have responded more to the survey (57.0%).

Before confinement, almost 73.0% of students did some PA, and the figure increased to 88.0% during confinement. Concerning pedagogical activities, 77.0% of PE teachers presented diverse proposals. Most have chosen video conference practical classes and video conferences with written work (73.5%). Conversely, the coaches implemented circuit training, walking, and cycling (34.1%). More frequently, students practice alone (43.8%) or with their parents and other family members (38.3%).

Regarding age, the students between 10 and 19 years old ( $14.3 \pm 2.4$  years old) were the group with more participants (41.0%), matching the secondary school level, the last level of compulsory education in Portugal.

Table 2. Descriptive data about three dimensions in analysis

	F	%
Students sex (female)	1,707	56.7
PA before lockdown (Yes)	2,191	72.7
PA during lockdown (Yes)	2,686	88.2
PE teachers’ proposals (Yes)	2,327	77.3
Types of proposals		
none	28	1.2
video conferences classes	1,247	53.6
circuit training walking & cycling	474	20.4
written work	10	0.4
written work & video conferences classes	464	19.9
written work & circuit training	104	4.5
Coaches’ proposals (Yes)	1,609	53.4
Types of proposals		
none	90	5.6
circuit training, walking & cycling (autonomous)	549	34.1
circuit training, walking, cycling & programs through sites	71	4.4
circuit training walking, cycling, programs through sites & video conferences	153	9.5
circuit training & specific training exercises (shooting, dribbling)	392	24.4
specific training exercises & video conference	339	21.1
specific training exercises, circuit training & programs through sites	15	0.9
With whom		
siblings	32	1.1
parents and other family	1,155	38.3
with friends	192	6.4
alone	1,319	43.8
team and coach	27	0.9
others	28	0.9
I don’t do it	258	8.6

Concerning sport and PA levels before and during the first period of confinement, the analysis of table 3 showed that was a decrease in PA for those who used to do some practice (girls 15.5% to 6.0%; boys 26,4.6% to 9.7%), and an increase of PA practice for those who did not use to practice (girls 84.5% to 94.0%; boys 73.6% to 90.3%). The relationship between practicing PA before and during lockdown, although significant, was very weak in both groups [female:  $(X^2(1) = 41.409, p < 0.001, \text{Cramer’s } V = 0.156)$ ; male:  $(X^2(1) = 52.151, p < 0.001, \text{Cramer’s } V = 0.201)$ ].

Table 3. Relation between the practice of Physical Activity before and during social isolation by sex

		Before social isolation, did you practice any sport or physical activity outside of school?							
		Female				Male			
		No		Yes		No		Yes	
		N	%	N	%	N	%	N	%
During social isolation do you do any type of physical activity / training?	No	85	15.5%	69	6.0%	72	26.4%	100	9.7%
	Yes	463	84.5%	1,090	94.0%	201	73.6%	932	90.3%
Total		548	100%	1,159	100%	273	100%	1,032	100%

\*Significant at 99%

Considering age groups although the differences are not statistically significant, for those who did not practice PA before lockdown, it was at the youngest ages groups that the greatest number of new practitioners were registered, especially in the 10-12 years old group (82.1%) and 13-15 years old group (82.4%). The oldest group, aged between 16 and 18 years old, had an increase: 79.5% of those who did not practice PA before began to do it during the lockdown, and 93.3% maintained their practice.

For those who usually do PA or sports, comparing the average frequency (number of times per week) of PA before and during isolation, the paired sample t-test shows

a significant decrease of PA frequency both in males ( $t(1025) = -5.223, p < 0.001$ ) as in females ( $t(1147) = -2.442, p < 0.015$ ).

Concerning the volume, the Wilcoxon rank test also reveals the existence of a significant decrease during lockdown for both genders (female:  $Z = -28.536, p < 0.001$ ; male:  $Z = -26.753, p < 0.001$ ). As it can be seen in table 4, the percentage of those who practice PA or sports at least for one and half hour decreased considerably (female  $n = 809$ ; 71.7% with  $n = 373$ , 32.1%; male  $n = 810$ ; 78.5%;  $n = 324$ ; 31.4%).

Table 4.

Volume of Physical activity before and during lockdown by sex

		Before Lockdown			During Lockdown		
		Female	Male	Total	Female	Male	Total
Up to 30 m	N	22	24	46	299	238	537
	%	1.9%	2.3%	2.1%	25.8%	23.1%	24.5%
1 hour	N	327	194	521	487	470	957
	%	28.2%	18.8%	23.8%	42.0%	45.5%	43.7%
1.5 hours	N	427	451	878	260	203	463
	%	36.9%	43.7%	40.2%	22.4%	19.7%	21.1%
2 hours or more	N	382	359	741	113	121	234
	%	33.0%	34.8%	33.9%	9.7%	11.7%	10.7%
Total	N	1,158	1,028	2,186	1,159	1,032	2,191
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5.

In lockdown, with whom students do Physical Activity

Sex	Fem.	N	In a situation of social isolation, with whom do you perform physical activity / training?				Total
			With family at my home	With friends' videoconference	Alone	With my coach and teammates videoconference	
			675	139	735	22	1,571
		%	43.0%	8.8%	46.8%	1.4%	100.0%
	Male	N	5,12	53	586	5	1,154
		%	44.4%	4.6%	50.6%	0.4%	100.0%
Total		N	1,187	192	1,319	27	2,725
		%	43.6%	7.0%	48.4%	1.0%	100.0%

Table 5 shows that students practice PA mainly with their family or alone. However, the percentage of girls who practice PA/exercise with friends through videoconferencing (n=139; 8.8%) is higher than boys (n=53; 4.6%). On the other hand, more boys practiced alone (n=586; 50.6% to n=735; 46.8%). Although statistically significant, the relationship is very weak ( $\chi^2(4) = 38.897$ ,  $p < 0.001$ ; Cramer's  $V = 0.116$ ).

We also compare the mean age across the various categories of the variable "with whom we practice PA", with significant differences being found ( $\chi^2_{kw}(3) = 341.016$ ,  $p < 0.001$ ). Those who practice PA alone are the oldest (15.3 years old; SD = 2.1), followed by those who practice PA with friends through videoconference (14.7 years old, SD = 2.1). On the other hand, those who do it with family members were the youngest (13.4 years old; SD = 2.5).

Concerning the nature of the activities proposed by the teachers, these were independent of the school level ( $\chi^2(35) = 43.380$ ,  $p = 0.141$ ), but related with the student's age ( $\chi^2_{kw}(5) = 43.254$ ,  $p < 0.001$ ). The differences rely between those whose teachers have not proposed any PA activity (14.8 years) and all others (younger), and between those whose teachers proposed written work & circuit training (13.6 years) and those who had video conference classes (14.5 years).

## Discussion

The purpose of this study was to analyze the students' PA participation levels during the first period of COVID-19 confinement in Portugal (~2<sup>nd</sup> to 4<sup>th</sup> week), with whom they did PA, and analyze the types of activities PE teachers and sports coaches have used for promoting PA. One main finding observed was the decrease in PA for those who were athletes and the increase in the practice of

PA for those who did not practice (only in PE classes) in this specific context. The younger students practiced PA mainly with their families and the oldest ones alone. Physical education teachers selected videoconferencing classes or circuit training plans with different activities. Coaches preferred activities where aerobic exercises maintained cardiorespiratory endurance (e.g., circuit training, walking, and cycling).

Regarding the practice of PA, these results only partially agree with other studies in the Portuguese context (DGS, 2020; Pombo et al., 2020). In these studies, there was a general decrease in the level of practice. It should be emphasized, however, that Pombo (Pombo et al., 2020) analyzed the PA of children under 13 years old. Also, that data was self-reported by parents, while the sample of the DGS study was composed of young people over 16 years old and adults, and there is no specific information if they were athletes. It should also be taken into account that the two studies were carried out in a slightly different period, in April. The study shows that the frequency and volume of PA decreased for those students who previously practiced PA regularly during confinement. Those who did not practice PA before confinement started exercising 4.1 sessions/week. The fact that they cannot do it with friends or peers, and that includes groups of the same skill level, taking into account their need to compete (Beni, Fletcher, & Ní Chróinín, 2017), may have reduced the frequency of their practice.

This also can mean that for those who are used to do exercise, doing it without the supervision of a qualified coach/teacher led to a significant decrease. This aspect strengthens the teacher and coach status, and in particular, PE teachers/coaches are perceived to be role models for children and adolescents when they encourage and support PA, or when they explain the activities during lessons, students and athletes can improve their levels of motiva-

tion (Ferman et al., 2010). However, in line with the results from a German study with adults and a Belgium study with children and adolescents (Constandt et al., 2020; Schmidt et al., 2020), was an increase in the PA for those who did not practice. In the initial phase, the novelty of being locked at home could have led to adolescents trying to do some PA, mainly those who were inactive before the lockdown, probably because they started to feel under psychological stress (Okuyama et al., 2021). Or their motivation to initially do some PA was probably due to the power of selecting autonomously and planning their training programs, or the accessibility to health information through information communication technology (ICT) could also increase the students' motivation to do PA, reinforced by the permission to leave home to exercise (Shaw et al., 2015).

Therefore, students may be more encouraged to be physically active when they feel they control their learning and time (Goodyear et al., 2019). For some students, PE is not fun; sports games such as basketball, soccer, or handball, which focus on competition and improving performance are unattractive activities (Griggs & Fleet, 2021). In this context, they could choose other things to do, reinforcing the importance of promoting meaningful experiences more aligned with the student's interests (Domville, Watson, Richardson, & Graves, 2019; Wintle, 2022).

Furthermore, some authors (Schmidt et al., 2020) state that low levels of PA are related to the context in which students are found. In Portugal, the number of school hours is higher than the OECD average in the first two school grades, and students spend 822 hours in school per year compared to 799 in other European countries. In the 3rd grade, Portugal is the second country with the highest school hours, only after Denmark (Rodrigues, 2017). Moreover, adolescents sit for too many hours during school, and sometimes they are not allowed to play in recess, so it is undoubtedly easier to participate in sedentary activities or be less active. During the surprising initial confinement phase, they had more free time and probably spent doing some PA. This can suggest that, from a political point of view, decisions regarding education should include a different school schedule to allow students to have more access to PA and sports programs in more favorable periods.

The investigation team also sought to determine if there was a sex difference relating to students' participation in PA (e.g., alone, with family members or friends). We found that the percentage of girls who practice PA/exercise with friends through videoconferencing is higher than that of boys; however, there were more boys practicing exercise alone.

In this study, we also found that students who practiced PA with family members were younger (13.4 years old). Some mention that they did PA with friends by videoconference (14.7 years old) or alone (15.3 years old), that is, older adolescents, in line with Khan (Khan, 2020).

In this context, it seems that families found pleasure in doing things together, and interacted more with students (Khan, 2020; Pluta, 2021). The PE classes at home may have been a resource for parental practice and an excellent opportunity to promote the benefits of PE status and its educational value (Coulter et al., 2021). Grounded on a social learning theory (Bandura, 1977), students' behavior and behavioral sets are likewise to be affected by social models. Accordingly, parental and peer modeling are recognized to empower and promote PA participation in childhood and adolescence, and it is positively associated with children's and adolescents' outdoor activities (Mutz & Albrecht, 2017; Pluta, 2021).

Although the physical distance, peers, and friends, can still provide a stimulus and help make healthy lifestyle choices in older ages. These results align with other studies that also found that the impact of parental modeling and support decreases from childhood to adolescence and increases the importance of peer and friend modeling and support (Mendonça et al., 2014).

Concerning the activities that PE teachers and sports coaches proposed to their students to continue doing PA activities during isolation, it seems that PE teachers were more proactive than coaches. Almost 46.6% of coaches did not present any activity for their athletes; on the opposite side, only 22.7% of teachers neglected their responsibilities. Probably there is one reason students generally increased their frequency and volume, and athletes decreased during the lockdown. For those who are used to exercise, doing it under the supervision of a qualified coach/teacher led to a more significant decrease in PA, probably due to their lack of social and emotional support (Howley, 2021).

Teachers preferred video conferencing classes (53.6%) or circuit training plans (20.4%), and only a few students (0.4%) chose written works at this time. However, PE and national Portuguese professional associations (CNAPEF, 2020a) prepared a joint declaration, given the impossibility of accomplishing the teaching-learning process as usual (practical activities). Based on that, some schools organized their pedagogical activities favoring these purposes: "Maintenance and raise of physical fitness from the perspective of health and well-being; learning processes of development and maintenance of physical fitness" (CNAPEF, 2020a).

Teachers' pedagogical choices need to consider that their activities should be, whenever possible, targeted, meaningful and appropriate to each specific school context and class, considering the needs and possibilities of each student and class group, accordingly to the specific guidelines expressed in PE departments/groups and school decisions. They could also consider the technology-based programs appealing and promising options for children and adolescents to promote PA (Daryabeygi-Khotbehara et al., 2021). Mobile health apps that foster physical activity have the potential to assist in behaviour change.

In turn, coaches selected aerobic plans (e.g., circuit

training, walking & cycling; 34.1%) and specific exercises linked to their sports and circuit training (24.4%). This study supports that, in this pandemic scenario, the school is a social structure that can provide PA opportunities for all (e.g., PE, recess, and sports programs). Schools are an expected context for transformative behavioural shifts related to healthy lifestyles (UNESCO, 2021c). Even if it means that teachers have to redefine themselves overnight, be prepared to learn all kinds of ICT tools, discover unknown talents in assisted instruction and network teaching (Palao et al., 2015; Villalba et al., 2017), and make room for the development of new teaching methods which, in some cases, can cause fear and expose some fragilities (Kretschmann, 2015; Orlando, 2014).

Undoubtedly, school PE teachers must seize this opportunity and try to make a difference in the lives of children and young people in the following difficult years, supporting and stimulating all students to engage in all kinds of PA (i.e., informal sports, sports in school time, outdoor PA) and promote PE status. Despite the tremendous efforts of teachers and schools, online PE teaching is not precisely PE and does not substitute live teaching. PE was the most affected subject during this period, and teachers must be prepared for a new period of outdoor teaching instead of online teaching. PE has a definite educative purpose in the school setting, and teachers need to clarify its exact value. PA has always been decisive and recognized for related benefits; now, it is even more critical. It is not the time to reduce but increase PE lessons and care for quality in PE (UNESCO., 2021a).

The period of confinement represented a monumental effort for all teachers, coaches, students, and their families. Isolation not only broke social interactions and physical proximity but all daily habits (Directorate-General for Education, 2020). What we are experiencing represents an abnormality that cannot (or should not) become normal, again, sustainable development begins with active, healthy, and physically engaged citizens (UNESCO, 2021b). This context must be seen as the most decisive and transformative of societies. It is fundamental to have a vision for young people considering an educative purpose (Lambert, 2017). This situation requires support and encouragement of students for different PA practices, according to their needs and levels of commitment, and the establishment of a new curriculum that ensures supported and peer-led learning and rounded skill development (UNESCO., 2021a) across life. Ensuring effective communication between multi-stakeholders (e.g., principals, parents, and other decision-makers at school and teams at different levels, local, regional, and national) is necessary to support and mobilize an integrated approach to universal sport-education-health development and their importance in a holistic foster of all students. This certainly will impact children's education, minimizing the restrictions imposed by the current pandemic context and developing cognitive and non-cognitive skills through PE to get students physically literate and future well-rounded

citizens (UNESCO, 2021c).

### Limitations and strengths of the study

This study has some limitations that need to be recognized. Despite being a survey released online (i.e., Facebook, WhatsApp, e-mail) developed to reach as many people as possible, most of the answers were from students that simultaneously sportspeople. This is a cross-sectional study whose participants do not constitute a representative sample. The results do not allow a statistical generalization; the statistical inference was made to quantify better the magnitude of the differences and relationships analyzed. However, like other studies (Constandt et al., 2020; Schmidt et al., 2020), it allows us to identify the PA and sport levels of a relevant sample of adolescents before and after the first lockdown. Furthermore, this is the first study that analyses the activities adopted by PE teachers and sports coaches during the lockdown.

### Conclusions

One of the study's main findings was the decrease in PA for those who were athletes and the increase in PA for those who did not practice in this specific context.

Although these are seemingly contradictory facts, it explores rationales widely discussed in the literature. Not only does it reinforce the status and role of the coach and the teacher, but it also highlights the need for new pedagogical strategies in PE according to the needs and interests of the students.

Furthermore, it shows a positive association between parental and peer support levels. Family at younger ages and peers and friends in adolescents significantly impact their participation in PA. They can provide encouragement or help in making healthy lifestyle decisions, such as influencing each other's PA. These data lead us to support the idea that two levels of influence need to be considered: a more political-financial one (i.e., more free time at work and school time, greater access to infrastructure for PA practice and sport) and investment in the quality of the PE profession itself, involving serious efforts to improve the quality of PE and PETE practices. Moreover, this last level influences the ability to adapt to unexpected situations, provides students with activities according to their needs and abilities, and promotes pleasure to maintain active lifestyles. Regarding the nature of the activities proposed by teachers and coaches for the continuity of PA activities during isolation, PE teachers proposed more videoconferencing classes and fewer written assignments. Most trainers chose circuit training, walking and cycling.

### Conflicts of Interest

The authors declare no conflict of interest.

## Acknowledgments

We thank to Adilson Marques, Irene Henriques and Pedro Gomes, for comments and translation of the manuscript.

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