Physical Activity Trajectory In The First 10 Months of The COVID-19 Pandemic in Southern Brazil: a Follow-Up Study

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Abstract

Background A continuous tracking of the PA level during the COVID-19 pandemic is important to understand how people's behaviour has varied along time. The aim of this study was to evaluate the physical activity (PA) trajectory over the first 10 months of the COVID-19 pandemic in the south of Brazil.

Methods Data from three timepoints of the PAMPA Cohort were used, as follows: 1) pre-COVID-19 (retrospective); 2) Jun-Jul 2020; 3) Dec 2020/Jan 2021. PA practice, frequency, duration, and place where activities were performed (at or out of home) were assessed.

Results A reduction in any, sufficient and out of home PA, as well as mean days and minutes were observed from the first (pre-COVID-19) to the second (Jun/Jul 2020) timepoint, followed by an increase in the third timepoint (Dec 2020/Jan 2021). Female participants showed lower PA prevalence for any, sufficient and out of home PA. No marked differences of PA prevalence were observed for income and educational level.

Conclusion During the first 10 months of COVID-19 pandemic there was a marked variability on PA pattern in adults from southern Brazil. An ongoing tracking of PA behavior during COVID-19 pandemic is important to understand how this behaviour varies and what actions are needed in order to increase PA on populational level.

Background

The COVID-19 pandemic has caused a profound social, economic, and behavioral impact on worldwide society. Although it is important to keep social distancing, in order to avoid virus spread, such action might have some deleterious health effects, such as impaired mental health and chronic disease management, as well as problems regarding healthcare access[1–3].

In Brazil there was no national lockdown so far and social distancing measures were adopted at the states and cities level, with a high variability across regions. Rio Grande do Sul, the southernmost state of the country implemented social restrictions measures such as schools closure and suspension of events (e.g. music concerts) by March 19th, 2020[4]. Since then, the level of restrictions varied by all state cities.

Regular physical activity (PA) has positive effects in the treatment and prevention of chronic disease as well as some infection conditions (ie. Upper respiratory tract infections)[5, 6]. Due to social restrictions applied to control virus spread, several exercise facilities were closed and people either looked for alternative ways to keep practicing their activities or became sedentary[7].

Robust evidences of direct effects of PA on COVID-19 treatment are still lacking[8], however, regular PA has been associated with a lower risk of developing COVID-19 severe cases, and consequently the risk of hospitalization[9, 10]. To help people keep active during the pandemic, the World Health Organization (WHO) released guidelines and examples of exercises that could be performed at home[11].

Several studies showed a decrease in PA in the first months of the COVID-19 pandemic[8]. However, a continuous tracking of the PA level during the COVID-19 pandemic is important to understand how people's behaviour has varied along time. In addition, PA might be included in gender and economic burden widened by the pandemic[12, 13]. Thus, this study aimed to evaluate the PA trajectory in the first 10 months of the COVID-19 pandemic. We also checked for the PA trajectory according to sex, income and educational level.

Methods

The present study analyses the first and second wave data from the PAMPA Cohort (Prospective Study About Mental and Physical Health), an ongoing ambispective cohort with adults aged 18 years or more living in the Rio Grande do Sul state, southern Brazil. The first data collection occurred from June 22nd to July 23rd, 2020, which was around three months after the implementation of the first social distancing measures at the state-level, and the second data collection took place on December/2020-January/2021. Brazil registered 2,287,475 cases and 84,082 deaths by the end of the first data collection (July 23rd), and 8,390,341 cases and 208,133 deaths by the second (January 15th)[14].

In the first data collection, participants answered questions regarding their current and pre-pandemic PA levels, and in the second data collection participants were again questioned about their current PA levels. Thus, our data have three time points: 1) pre-COVID-19, 2) Jun/Jul 2020, and 3) Dec/2020-Jan/2021.

This study was approved by the local Ethics and Research Committee. The entire protocol might be accessed elsewhere for more details about procedures[15]. All data collection was performed throughout an online-based questionnaire. The first wave was structured via Google Forms, and the second wave via the REDCap platform[16, 17].

The questionnaire was spread using a four-arm approach: personal contacts, universities contacts, local media, and social media. The questionnaire's link was spread to all macro-regions (Sul, Centro-Oeste, Missioneira, Vales, Norte, Metropolitana, Serra, in Portuguese) of Rio Grande do Sul state via boosted publication on Facebook® and Instagram® in order to reach the needed number of participants in each region.

Physical activity

Participants were asked about their regular PA practice before and during the social distancing period (yes or no), through the following question: "*Were you engaged in physical activity on a regular basis (before / during social distancing / in the last seven days)?*". For PA practice, those who answered "yes" were asked about the frequency ("*How many days in the week do you practice these activities?*") and duration ("*On the days that you practice these activities, how many minutes on average do they last?*") of activity practiced. For analysis purposes two PA variables were built: 1) any PA, based on the PA practice question (Yes or No); and 2) sufficient PA, based on WHO 150 min/week recommendation, where participants were categorized into active or inactive[18].

Participants also indicated where and the activities took place (at or out of home). Those activities performed within participant's household were defined as at home PA, and those performed external to participants' household (eg parks, shared gyms) were defined as out of home PA. The activities performed at home were indicated by the participants: walking/running, jump rope, stationary bike, strength exercises, stretching exercises, stair climbing, functional training, or any other not quoted before. In addition to the options mentioned for at home activities, the following response options were available for activities performed out of home: aerobics/spinning/step/jump, water exercises, stair climbing, swimming, soccer, volleyball, basketball, tennis, paddle tennis, or other racquet sports, martial arts, and fighting, dance or any other not quoted before. Participants could indicate as many activities they performed. For analysis purposes, only activities with at least 5% prevalence on pre-COVID-19 timepoint were included in the activities list in the results section.

Covariates

Gender (female, male, non-binary or other/not declared) and educational level (categorized as high school or lower, university degree, and specialized/Master/Ph.D) were used as covariates. Moreover, to verify the impact on the income during pandemic, participants were asked if their monthly income had been affected by social distancing measures. The possible answers were "no", "yes (for less)", "yes (for more)". For analysis purposes this variable was dichotomized in yes (reduced) or no.

Statistical analysis

Data are presented as mean $\pm$ 95% Confidence Interval (CI) for numerical, and proportions and 95%CI for categorical variables. The generalized estimating equation was used to investigate changes in PA along with the three-time points and how they varied by gender, educational level and income. Results were expressed as predictive margins with the prevalence of PA (any, sufficient and place where PA was performed) and their respective 95%CI for participants who had information regarding PA in the three-time points assessed (n=675). All analyses were conducted in Stata statistical software (version 15.0; StataCorp LLC, College Station, TX).

Results

Pre- and during social distancing PA patterns are displayed in Table 1. From the first (pre-COVID-19) to the second (Jun/Jul 2020) timepoint a reduction in any, sufficient and out of home PA prevalence, as well as mean PA days and minutes were observed. However, an increase was observed in the third timepoint (Dec 2020/Jan 2021). Even though these PA variables augmented from the second to the third timepoint, it was not enough to reach the pre-COVID-19 values. Regarding the PA practiced at home, there was no marked differences in the prevalence among timepoints.

Table 1
PA patterns across the three timepoints assessed. Rio Grande do Sul, Brazil (n=675).

	Pre-COVID-19	Jun / Jul 2020	Dec 2020 / Jan 2021
Any PA (%; 95%CI)	68.7 (63.8; 73.2)	47.1 (42.2; 52.0)	60.1 (55.2; 64.8)
Sufficient PA (≥ 150 min/w) (%; 95%CI)	41.5 (36.7; 46.4)	22.1 (18.4; 26.3)	37.9 (33.3; 42.8)
PA at home (%; 95%CI)	40.8 (36.1; 45.7)	42.2 (37.4; 47.1)	40.1 (35.4; 45.0)
PA out of home (%; 95%CI)	59.4 (54.5; 64.2)	30.1 (25.8; 34.7)	54.3 (49.4; 59.2)
Days of PA (mean; 95%CI)	2.8 (2.6; 3.0)	1.8 (1.7; 2.0)	2.4 (2.2; 2.6)
Minutes of PA (mean; 95%CI)	38.7 (36.2; 41.1)	25.2 (23.0; 27.5)	35.5 (32.8; 38.3)

Table 2 shows the prevalence of PA types performed at and out of home in the three-timepoints assessed. An increase in most activities performed at home was observed from the first (pre-COVID-19) to the second (Jun/Jul 2020) timepoint. On the other hand, a reduction in activities performed out of home was observed between these two timepoints. At the third timepoint (Dec 2020/Jan 2021), most activities performed at home decreased, while those performed out of home, increased. Even though an increase in activities performed out of home was observed from the second to the third timepoint, it was still lower than pre-COVID-19 levels.

Table 2
PA practiced at home and outside in the three timepoints assessed (%; 95%CI). Rio Grande do Sul, Brazil (n=675).

<i>At home</i>	Pre-COVID-19	Jun/Jul 2020	Dec 2020 / Jan 2021
Walking/running	10.6 (7.9; 14.1)	13.5 (10.5; 17.1)	11.4 (8.7; 14.9)
Jump Rope	5.9 (4.0; 8.6)	9.9 (7.3; 13.1)	3.8 (2.3; 6.2)
Stationary bike	5.1 (3.3; 7.7)	4.4 (2.8; 6.8)	5.3 (3.5; 7.9)
Strength exercises	16.8 (13.4; 20.8)	30.2 (25.9; 34.8)	16.5 (13.3; 20.4)
Flexibility exercises	15.8 (12.6; 19.5)	21.8 (18.2; 25.9)	13.3 (10.4; 16.7)
Climb Stairs	13.5 (10.7; 16.8)	11.8 (8.9; 15.4)	11.5 (8.7; 15.0)
<i>Out of home</i>			
Walking/running	48.3 (43.4; 53.2)	22.1 (18.3; 26.4)	38.2 (33.5; 43.1)
Jump Rope	5.1 (3.4; 7.8)	2.8 (1.5; 5.1)	3.4 (1.9; 5.9)
Ride bike	21.8 (18.1; 26.1)	10.2 (7.7; 13.5)	13.8 (10.9; 17.3)
Strength exercises	20.5 (16.9; 24.7)	9.9 (7.3; 13.4)	18.2 (14.8; 22.3)
Flexibility exercises	12.2 (9.5; 15.5)	5.9 (3.9; 8.7)	10.2 (7.6; 13.7)
Climb Stairs	8.9 (6.5; 12.1)	3.9 (2.5; 6.4)	2.6 (1.3; 5.2)

No marked differences in PA prevalence related to educational level and income were observed for any (Figure 1) and sufficient (Figure 2) PA through the timepoints. However, female participants showed lower prevalence of any PA at first and second timepoints, and of sufficient PA at the third timepoint. Regarding where PA took place, lower prevalence of PA performed out of home was observed in female (second and third timepoint) and participants less schooled (high school or lower) at the second timepoint (Figure 3). No marked differences in PA performed at home was observed (Supplementary Material).

Discussion

Our study revealed a marked variability in PA patterns during the COVID-19 pandemic. After a reduction in the first months of pandemic, an increase in PA levels was observed in roughly 10 months of social distancing, yet it did not reach the same level as before the pandemic. Also, women showed decreased PA when compared to men. This PA scenario during social distancing was evident regardless of socioeconomic characteristics, such as educational and income level.

The decrease in PA levels in the first months of the COVID-19 pandemic was expected due to social restrictions imposed by governments to reduce virus spread[8]. We hypothesized that the magnitude of this scenario would be related to the restrictions level. However, there is a disparity of data observed in our study and state-level social distancing measures in the three survey timepoints. From May 2020 to

May 2021, the Rio Grande do Sul state adopted the “Controlled Social Distancing Model”, which outlined the risk of COVID-19 infection in a flag color-coded approach. Each region was evaluated by several health indicators (e.g. ICU availability, rate of new COVID-19 cases), and regions of the state were categorized based on risk of infection, as follows: low (yellow), medium (orange), high (red), and extremely high (black)[19]. In the first data collection (Jun/Jul 2020), all the Rio Grande do Sul state was either at orange or red colors, which indicated a strengthened social restriction level, corresponding with the lower PA level observed. Such levels could also be related to the fact that the winter (Jun/Jul/Aug) in Rio Grande do Sul is very cold and humid, which might be a barrier to PA[20]. Similarly, by Dec/Jan, the social restrictions were also strengthened after a period of easiness. Thus, we hypothesized that PA levels would be at a similar level when compared to Jun/Jul assessment. Nevertheless, the increase in PA levels observed in Dec/Jan was probably related to weather conditions (summer season), as many people feel encouraged to practice PA, especially outdoors. In addition, several individuals did not follow governments' recommended social distancing instructions, which might also explain our findings[21].

A survey conducted in Brazil indicated that lack of appropriate facilities and equipment, were barriers to PA practice during pandemic[22]. In both cohort assessments, gyms and sports facilities were closed in most cities of the Rio Grande do Sul state. Thus, people had to find ways and other spaces to remain active. A decreased PA in the first assessment (Jun/Jul) of social restrictions followed by an increase in the second assessment (Dec/Jan) was observed for activities performed out of home. This was expected, since summer season (Dec/Jan/Feb) is tempting to perform PA outdoors, and people were never forbidden of walking or riding bicycles as well as performing exercises in public spaces (e.g., parks). The weak social restrictions adopted by the state, along with encouragement messages from the national government that people could keep their “normal lives” and routines despite de pandemic[21], could also be related to the increased practice of PA out of home.

The gender inequalities related to PA are well described[23] and was further aggravated because of COVID-19 pandemic social restrictions. The burden on women regarding home chores and care taking was even more evident with the routine imposed by the pandemic, as well as the social barriers related to PA practice for women[24]. These inequalities have a negative effect on women’s leisure time, which is related to their lack of time and possibility to include PA in their daily routine[24]. Also, due to these inequalities, it is possible that women are more likely to experience incidental PA, such as home-related chores[25]. Unfortunately, we have only assessed leisure-time PA.

Educational level is a strong determinant of leisure-time PA. People with high educational levels are more likely to have access and resources to engage in healthy behaviours, such as PA[26]. There were no marked differences of PA prevalence among educational level groups, with a difference only in the Jun/Jul timepoint for activities performed out of home, where participants with low educational level (i.e. High school or low) showed less PA. However, our sample has a high proportion of participants with academic degree (40.2%), which is overexpressed when compared to the national data (16.9%)[1, 27]. The high educational level of our sample might hide disparities among classes and explain the small education effect of PA in our results.

Strength and limitations

Some limitations of our study should be listed. First, our study presented a retention rate of 52%[15], which is not very high. However, even studies in wealthier countries, where more people have internet access achieved similar response rates when compared to our study[28]. Second, as face-to-face interviews were not allowed by ethics boards in Brazil at the time of our data collection, self-reported assessments were used. Third, as previously stated, our sample has a high proportion of participants with an academic degree, thus, sampling bias is an issue since less educated people have limited access to internet[29]. However, one feature of our study stands out, we tracked PA behaviour from pre-COVID-19 levels into 10 months of social restrictions. Such information can contribute to a better understanding of not only how people behave but also how the pandemic scenario has affected their health on a long term.

Perspective

COVID-19 pandemic increased the concern with physical inactivity due to social restriction measures. Although a lot of studies were conducted at the beginning of pandemic and showed a decrease on PA levels, continuous tracking of this behaviour is important. Our study demonstrates how PA varied along the first 10 months of COVID-19 pandemic, and is still far from the desirable levels. An ongoing tracking of PA behavior during COVID-19 pandemic is important to understand how this behaviour varies and what actions are needed in order to increase PA on populational level.

Conclusion

PA showed a marked variability during the first 10 months of COVID-19, decreasing in the first months and increasing afterwards. However, the latter increase was not enough to reach the pre-pandemic PA levels. This pattern was observed regarding PA practice, minutes and days of PA per week, as well as activities performed out of home.

Abbreviations

PA – Physical activity

Declarations

Ethics approval and consent to participate

This research was conducted in accordance with the Declaration of Helsinki on human research. The study was approved by the ethics institutional board from the School of Physical Education, Federal University of Pelotas, Brazil (CAAE: 31906920.7.0000.5313). All participants give formal consent before taken part in the study.

Consent for participation

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

None.

Authors' contributions

ELC, NF, FFR, MCS, and AJR conceived the study. ELC performed all analyses and led the writing of the manuscript. JSL, JC, IRD, FMD, CMH, RA, FFR, MCS, and AJR revised manuscript. All authors approved the final version of the manuscript.

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Figures

Figure 1

Prevalence of any PA before and during COVID-19 pandemic for sex (A), educational level (B) and decreased monthly income (C). Rio Grande do Sul, Brazil. (n=675).

Figure 2

Prevalence of sufficient PA before and during COVID-19 pandemic for sex (A), educational level (B) and decreased monthly income (C). Rio Grande do Sul, Brazil. (n = 675).

Figure 3

Prevalence of PA performed out of home before and during COVID-19 pandemic for sex (A), educational level (B) and decreased monthly income (C). (n = 675).

Supplementary Files

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