Epidemiology

The decrease in the physical activity levels during the COVID-19 social distancing period

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Abstract - Aim: Social distancing policies to combat the pandemic of COVID-19 directly impacted the physical activity (PA) index of the population. This study aimed to analyze the factors associated with insufficient leisure-time PA and the changing behavior of residents of the city of Sao Paulo, the epicenter of the pandemic in Brazil. **Methods:** The questionnaire used in this research was made available online and included questions on demographics and physical activity. A total of 1.096 adult residents of Sao Paulo completed the questionnaire between July 8th and August 8th, 2020. **Results:** For individuals who were already physically active before the restrictions, a total of 55.8% of the sample kept insufficiently active during the quarantine. Factors such as education, working conditions, and direct relationship with Covid-19 care were associated with decreased leisure-time PA practice, impacting 57.6% of the sample, especially females. People with less formal education, those who possibly changed their routines to working from home, and those who were directly connected to Covid cases were not able to maintain a daily PA routine. **Conclusion:** The data presented here warn about the impacts of the pandemic on engagement in PA, suggesting the need for incentives from intersectoral public policies on sports, leisure, and health to perform these activities.

Keywords: changes in physical activity, insufficiently active, covid-19, quarantine, Sao Paulo, pandemic.

Introduction

COVID-19 is a disease caused by the SARS-CoV-2 virus. Due to its high rate of transmissibility, it has caused one of the largest pandemics in history in a very short period[1]. The first cases of the disease date back to December 2019 in the Wuhan province (China) and were rapidly spreading to all continents[2,3].

Approximately one month after the first cases were identified, on January 30, 2020, the World Health Organization (WHO) declared the outbreak of cases a global public health emergency, posing a high risk to countries with vulnerable health systems[4]. In Brazil, a public emergency was registered on February 3rd, 2020. With it, policy Nº 13,979, of February 6th, 2020, was approved, establishing the measures to face the virus outbreak, including quarantine and social isolation[5].

The first official case of COVID-19 in Brazil was registered on February 26, 2020, in the city of Sao Paulo, considered the epicenter of the pandemic in the country[6]. The patient was a 61-year-old man, who recovered days later. He had returned from a trip from Lombardy, Italy, a region that had reported a high number of cases at the time[7]. The first death in Brazil also occurred in Sao Paulo, on March 12, 2020. She was a housemaid who lived in the Cidade Tiradentes neighborhood in the eastern part of the city[8].

The Ministry of Health recognized the community transmission of the new coronavirus throughout the Brazilian territory soon after, on March 20th, and that, consequently, it would be necessary to implement measures to contain COVID-19[9]. In the city of Sao Paulo, the most populous in the country, with approximately 12 million inhabitants[10], the state government established Decree number 64.881 starting on March 22, 2020. The decree demanded quarantine and social distancing measures in order to inhibit agglomerations and avoid the virus proliferations[11].

Measures to restrict the movement of people are considered effective approaches by the scientific community to reduce the infection rate of contagious diseases

such as COVID-19 [12]. However, these also caused the temporary closure of gyms and fitness centers, directly impacting the possibility of individuals remaining physically active[13].

Physical activity has positive effects that have been widely explored in the scientific literature. Among these are reducing overall cardiovascular risks, lowering blood pressure, increasing immune system protection, and preventing noncommunicable chronic diseases - an intervening factor associated with severe cases among those infected with Covid-19. In addition, physical activity provides a decrease in anxiety and stress levels, promotes mental health benefits, and can be an effective coping strategy against the effects of the pandemic and social withdrawal[14-16].

It is important to consider that the last VIGITEL[17], the surveillance system of risk factors for chronic noncommunicable diseases of the Brazilian Ministry of Health, pointed out that only 39% of the adult population studied reached the recommendations for leisure-time physical activity. That is, before the Covid-19 pandemic, less than half of the Brazilian population did not dedicate 150 min a week to physical activity. Considering the restrictions of space, movement of people, the impacts on mental health, the disorganization of information between the Ministry of Health and state governments, the changes in terms of work-leisure and residentialization, it is presumable that the levels of physical activity of the Brazilian population would decrease.

However, the scientific community and governmental institutions have made efforts to disseminate materials promoting the benefits of physical activity and the reasons why this behavior should not be abandoned during this critical time[18]. Although these efforts are observed, the first population-based study conducted in Brazil, which aimed to describe the practice of leisure-time physical activity during the COVID-19 pandemic in Bagé -RS, concluded that only 24.4% reported practicing PA during the pandemic[19]. Another Brazilian study estimated that 36.3% of the research participants were not sufficiently active during the pandemic[20].

Considering these recent results on the levels of physical inactivity in the Brazilian population during the pandemic, this study proposes an analysis of the factors associated with insufficient physical activity and the change in behavior related to physical activity in residents of the city of Sao Paulo during social withdrawal.

Methods

Sample and procedures

The present study involved a cross-sectional survey based on a web-based self-administered questionnaire aimed at residents of the city of Sao Paulo, the city most affected by the COVID-19 pandemic in Brazil[21]. Team leaders sent invitations, including a link for an anonymous online survey during the data collection time through the Qualtrics survey tool website to potential participants via the study flyer posted on both their personal and institution's social media accounts (e.g., Facebook, Twitter, and Whatsapp). The first page of the survey contained a screening question to determine participant eligibility (≥18 years old). Eligible participants were directed to review study information, including instructions on voluntary informed consent before proceeding to the survey; otherwise, participation was discontinued. The survey took approximately 15 min to complete. Data were collected between 08 July and 08 August 2020. We received 1440 surveys related to physical activity responses. Of these, 344 (23.9%) surveys were excluded because of missing data. The final sample for this study included 1096 surveys. The Human Research Ethics Committee (CEP) of the School of Arts, Sciences and Humanities (EACH) of the University of São Paulo (USP) approved the study protocol under the number 32922620.0.0000.5390.

Study variables and measures

The electronic questionnaire included demographic information (age, gender, highest level of education, ethnicity, religion, marital status, employment, area of residence in the city of Sao Paulo, changes in income since the beginning of the COVID-19 pandemic), frequency of leisure-time physical activity before the period of social withdrawal, level of physical activity during quarantine, and, questions about self-perception of the impact of COVID-19 on their physical activities and life routines. The study further asked about members of the household who were over 65 years old or were children.

Physical activity (PA) was measured using the 7-item short form of the International Physical Activity Questionnaire (IPAQ). The IPAQ has been validated among individuals aged 15 or older, in multiple languages, and has a test-retest reliability of above 0.80[22]. Participants were asked to report the leisure-time PA (e.g., recreation, exercise, or sport) that they have engaged in during lockdown policy in Sao Paulo, the frequency (measured in days per week) and duration (minutes per day) for each of the three specific types of leisure time.

Levels of PA: 1) vigorous activities (which require intense physical effort and make breathing more challenging); 2) moderate-intensity activities (for example, activities that require more physical effort than expected and make your breathing a little more difficult than regular); and 3) walking[22]. Participants were instructed not to include activities related to work, transportation, or domestic life. To calculate the total minutes of vigorous-intensity PA, moderate-intensity PA, and walking per week, we multiplied the average daily minutes of each

type of PA by the corresponding intensity days, respectively[22]. To estimate the total weekly metabolic equivalent of task minutes (MET), we multiplied the total minutes of vigorous-intensity PA, moderate-intensity PA, and walking per week obtained above with the corresponding average MET ratios established in the IPAQ, which are 8, 4, and 3.3, respectively[23,24]. We then classified the weekly PA level into four categories using the combination of total days, minutes, and MET-minutes of PA per week based on the official IPAQ-SF guidelines: 1) none, 2) low-, 3) moderate-, or 4) high-level PA. We further classified participants who were in the none or low-level of PA category as insufficiently active[25].

Change in PA during lockdown was measured by asking participants to report changes in their level of PA engagement during the lockdown as compared to their level of PA engagement before the COVID-19 lockdown, with three possible response categories: increase, decrease, or no change. We used a dichotomous variable (decrease vs. otherwise) in our regression models[25].

Location and mode of PA engagement during lockdown were measured among participants who reported that they engaged in PA during the lockdown. Participants were asked questions about the location and mode of their PA engagement, including the location of their PA (indoor or outdoor, home, or public place); with whom, if anyone, they engaged in PA; frequency of using online programs to assist their exercise; frequency of using PA as a coping strategy; and frequency of encouraging others to engage in PA during lockdown[25].

Statistical analysis

In the descriptive analysis, the qualitative variables were summarized in absolute and relative frequencies. and relative frequencies. The chi-square test or Fisher's exact test was used for the initial comparison of categorical variables. Logistic regression models were used to identify factors associated with physical activity variables, with insufficiently active (yes or no) and change in physical activity (decreased or otherwise) as response variables. physical activity (decreased or otherwise).

The variables were first analyzed separately using univariate logistic regression models. Then a multivariate logistic regression model was fitted. The first model included all variables with $p < 0.20$ in the association analysis. Variables without statistical significance were excluded one by one until the final model, which included only the statistically significant variables.

The significance level for the hypothesis tests and final model was set at 0.05. The quality of fit of the final regression model was assessed by the Hosmer-Lemeshow test. Results are expressed as odds ratio (OR) with the corresponding 95% CI and p-value. All analyses were performed in the R Core Team (2021) software.

Results

Study participants

The sociodemographic profile of individuals, according to the insufficiently active and change of PA variables is described in Table 1. Regarding the insufficiently active variable and age, the groups that obtained the lowest scores were those between 25-34 years 30.1%, followed by 18-24 years 25.7% and 35-44 years 18.8%. The data showed gender differences. Most women (74.7%) reported being insufficiently active, and despite the level of education, the lowest scores were observed for those with bachelor's degrees 34.2%, followed by those with graduate degrees 33.1%. Regarding marital status, 55.9% of single people are insufficiently active; regarding ethnicity, 64.5% of those who declared themselves white are insufficiently active, as well as 79.6% of those who do not live with at least one person 65 years old or older, and 51% in which income has not decreased since COVID. Regarding the variable change in PA and age, the groups that decreased physical activity were those aged 25-34 years (32.1%), followed by 18-24 years (21.4%) and 35-44 years (21.2%). Furthermore, 71.7% of females reported a decrease in PA. A further 38.1% of those with completed graduate degrees also reduced PA. Regarding marital status, 56.6% of singles observed a decrease in PA; regarding ethnicity, 67.9% of those who self-reported white decreased physical activity, as well as 78.5% of those who do not live with at least one person 65 years old or older, and 50.9% of those whose income decreased since COVID.

Insufficiently active and PA change

Regarding the variable change in PA and age, the groups that decreased physical activity were those aged 25-34 years (32.1%), followed by 18-24 years (21.4%) and 35-44 years (21.2%). Furthermore, 71.7% of females reported a decrease in PA. A further 38.1% of those with completed graduate degrees also reduced PA. Regarding marital status, 56.6% of singles observed a decrease in PA; regarding ethnicity, 67.9% of those who self-reported white decreased physical activity, as well as 78.5% of those who do not live with at least one person 65 years old or older, and 50.9% of those whose income decreased since COVID.

Among the leisure-time PA practiced by the total sample, including those considered insufficiently active (categorized as not meeting the 150 min minimum recommended by the WHO) walking was the PA of prominence, practiced by 27.2% of people. Weight training and calisthenics came in second with 13.6%. Stretching was done by 11.3%, running by 10.7%, yoga/meditation by 10.3%, and dancing by 9.7% of the study population. Bicycling was done by 7.2% of the sample while pilates was done by

Table 1 - Sociodemographic profile of individuals, according to the variables Insufficiently active and PA change.

Variables	Insufficiently active				p	PA change				p
	Yes n = 612		No n = 484			Decreased n = 632		Otherwise n = 464		
	n	%	n	%		n	%	n	%	
Age					0.611					0.049
18-24	157	25.7%	109	22.5%		135	21.4%	131	28.2%	
25-34	184	30.1%	164	33.9%		203	32.1%	145	31.3%	
35-44	115	18.8%	91	18.8%		134	21.2%	72	15.5%	
45-54	87	14.2%	59	12.2%		81	12.8%	65	14.0%	
55-64	56	9.2%	50	10.3%		63	10.0%	43	9.3%	
65 or more	13	2.1%	11	2.3%		16	2.5%	8	1.7%	
Gender					0.561					0.059
Male	155	25.3%	131	27.1%		179	28.3%	107	23.1%	
Female	457	74.7%	353	72.9%		453	71.7%	357	76.9%	
Level of Education					0.069					0.360
Did not finish High School/Completed High School	167	27.3%	106	21.9%		148	23.5%	125	26.9%	
Concluded the College	34	5.6%	26	5.4%		33	5.2%	27	5.8%	
Concluded the Undergraduate	209	34.2%	158	32.6%		210	33.2%	157	33.8%	
Concluded Post Graduation	202	33.0%	194	40.1%		241	38.1%	155	33.4%	
Marital Status					0.249					0.388
Single	342	55.9%	278	57.4%		358	56.6%	262	56.5%	
Married	213	34.8%	179	37.0%		225	35.6%	167	36.0%	
Widow	8	1.3%	3	.6%		9	1.4%	2	4%	
Divorced	37	6.0%	18	3.7%		28	4.4%	27	5.8%	
Separate	12	2.0%	6	1.2%		12	1.9%	6	1.3%	
Ethnicity					0.154					0.783
White	395	64.5%	340	70.2%		429	67.9%	306	65.9%	
Black	70	11.4%	39	8.1%		62	9.8%	47	10.1%	
Brown	104	17.0%	77	15.9%		104	16.5%	77	16.6%	
Asian	43	7.0%	28	5.8%		37	5.9%	34	7.3%	
Living with at least one person 65 years old or older					0.851					0.487
No	487	79.60%	382	78.90%		496	78.50%	373	80.40%	
Yes	125	20.40%	102	21.10%		136	21.50%	91	19.60%	
Income has decreased since COVID					0.847					0.244
No	312	51.0%	243	50.2%		310	49.1%	245	52.8%	
Yes	300	49.0%	241	49.8%		322	50.9%	219	47.2%	

6.2%. High-intensity interval training, HIIT, was practiced by 4.3% and skipping rope by 3%. Other practices such as wrestling and playing tennis, for example, were done by a total of 1.7%. The factors associated with insufficient physical activity during the pandemic are shown in Table 2. The data in the crude analysis show that people who did not finish high school or have only completed high school (OR: 1.51; 95%CI: 1.11-2.07) and the group who commuted less than once a month (OR: 0.81; 95%CI 0.39-1.68) had higher chances of being insufficiently active during the period of social withdrawal, while they had lower chances of being insufficiently active. People with a completed postgraduate degree, who were performing individual activities and essential daily travel, and people who had close contact with or cared for a Covid-19 patient had lower odds of being insufficiently active during social withdrawal.

Regarding the factors associated with decreased physical activity (change in behavior related to physical activity), according to Table 3, the results indicate that people aged 35-44 years (OR: 1.81; 95% CI 1.25-2.63) who were able to perform PA before the pandemic “most

Table 2 - Factors associated with insufficient physical activity during social withdrawal (n = 1096) of residents of the city of Sao Paulo, SP, Brazil.

Variables	Gross analysis			Adjusted analysis		
	OR	IC95%	p	OR	IC95%	p
Level of education						
Did not finish High School/Completed High School	1.51	1.11-2.07	0.009	1.40	1.02-1.94	0.040
Concluded the College	1.26	0.73-2.19	0.415	1.24	0.71-2.21	0.451
Concluded the Undergraduation	1.27	0.95-1.69	0.100	1.23	0.92-1.65	0.169
Concluded Post Graduation	1.00	-	-	1.00	-	-
Ethnicity						
White	1.00	-	-	-	-	-
Black	1.54	1.02-2.36	0.041	-	-	-
Brown	1.16	0.84-1.62	0.369	-	-	-
Asian	1.32	0.81-2.19	0.272	-	-	-
How often are you doing						
individual activities or essential travel						
Never	1.00	-	-	1.00	-	-
Daily	0.24	0.12-0.46	<0.001	0.24	0.12-0.47	0.000
More than once a week	0.42	0.23-0.73	0.002	0.41	0.23-0.73	0.003
Once a week	0.70	0.39-1.20	0.200	0.69	0.39-1.20	0.197
2-3 times a month	0.69	0.38-1.20	0.196	0.64	0.35-1.13	0.128
Once a month	0.79	0.40-1.51	0.472	0.74	0.38-1.45	0.385
Less than once a month	0.81	0.39-1.68	0.568	0.83	0.39-1.73	0.613
Have you had close contact with or cared for a patient diagnosed with COVID-19 (yes)	0.65	0.46-0.92	0.016	0.69	0.48-0.99	0.045

OR: Odds Ratio; 95%CI: 95% Confidence Interval; $p > 0.05$. The crude analysis included all variables with $p < 0.20$ in the association analysis. The adjusted analysis included variables with $p > 0.05$

Table 3 - Factors associated with decreased physical activity (PA change) during social withdrawal (n = 1096) of residents of the city of Sao Paulo, SP, Brazil.

Variables	Gross analysis			Adjusted analysis		
	OR	IC95%	p	OR	IC95%	p
Age						
18-24	1.00	-	-	1.00	-	-
25-34	1.36	0.99-1.87	0.062	1.35	0.97-1.88	0.077
35-44	1.81	1.25-2.63	0.002	1.92	1.31-2.84	0.001
45-54	1.21	0.81-1.82	0.358	1.24	0.81-1.90	0.318
55-64	1.42	0.90-2.25	0.131	1.54	0.96-2.49	0.077
65 or more	1.94	0.82-4.93	0.141	1.86	0.77-4.79	0.177
Gender						
Male	1.00	-	-	1.00	-	-
Female	0.76	0.57-0.99	0.050	0.71	0.53-0.94	0.019
Health before COVID						
Excellent	1.00	-	-	-	-	-
Very good	1.05	0.74-1.50	0.788	-	-	-
Good	0.81	0.56-1.17	0.269	-	-	-
Regular	0.54	0.33-0.87	0.013	-	-	-
Bad	0.28	0.06-1.04	0.071	-	-	-

(*continued*)

Table 3 - continued

Variables	Gross analysis			Adjusted analysis		
	OR	IC95%	p	OR	IC95%	p
Ability to perform AF before COVID						
A little/ Not at all	1.00	-	-	1.00	-	-
Completely	5.09	2.76-10.0	<0.001	4.99	2.66-9.96	<0.001
Most of the time	5.10	2.63-10.5	<0.001	5.02	2.55-10.43	<0.001
Moderately	2.72	1.35-5.76	0.007	2.39	1.17-5.14	0.020
How often are you doing individual activities or essential shifting						
Never	1.00	-	-	1.00	-	-
Daily	0.41	0.21-0.77	0.007	0.31	0.16-0.61	0.001
More than once a week	0.56	0.32-0.98	0.046	0.47	0.26-0.84	0.012
Once a week	0.84	0.48-1.43	0.522	0.73	0.41-1.28	0.284
2-3 times a month	0.75	0.42-1.30	0.307	0.69	0.38-1.23	0.217
Once a month	0.56	0 29-1.06	0.078	0.56	0.29-1.10	0.095
Less than once a month	0.65	0.32-1.33	0.244	0.66	0.31-1.37	0.264
Live alone during the quarantine period (Yes)	1.58	1.06-2.39	0.028	-	-	-

OR: Odds Ratio; 95%CI: 95% Confidence Interval; $p > 0.05$. The crude analysis included all variables with $p < 0.20$ in the association analysis. The adjusted analysis included variables with $p > 0.05$.

of the time" (OR: 5.02; 95% CI 2.55-10.43) have a higher chance of having decreased physical activity during the pandemic, possibly justified by the restrictive distancing measures adopted. Women have a lower chance of having decreased physical activity (OR: 0.71; 95% CI 0.53-0.94), justified by their difficulty in keeping sufficiently active since the time before the pandemic. On the other hand, those who are performing essential commuting activities during the pandemic (OR: 0.31; 95% CI 0.16-0.61), have a lower chance of having changed their physical activity-related behavior, i.e., they have not decreased their physical activity.

Discussion

The present research brings important results about the involvement in leisure-time physical activities during the period of social distancing caused by the pandemic in the city of Sao Paulo. Considering that this city became the epicenter of COVID-19 in Brazil in the year 2020[21], and is still one of the main cities in the number of cases in Brazil and the world[26], affecting mostly non-white and low-income people[27], the data presented here can subsidize actions in the realm of public health, sports, and leisure policies, contributing with actions to confront the crisis, especially for this most affected population.

A study that compared levels of physical activity, income inequality, and gender indicates high levels of insufficient physical activity in countries with higher levels of income inequality, and the same is true for gender inequality, regardless of a country's wealth levels[28]. The study encourages the adoption of measures to address inequalities that may be acting on a systemic and social scale, and regarding the levels of physical activity by gender, women have higher rates of physical inactivity when compared to men, 1.50% higher[28].

The descriptive data of the research warns us about important issues regarding different conditions of access to PA practice. It showed a high rate of people classified as insufficiently active who decreased their involvement in PA during the pandemic. The study by Sallis et al.[16] showed that there was a reduction in the participant's level of physical activity from before to during the period of adoption of social distancing measures. This behavior change was more evident in those who were not sufficiently active before the measures were adopted. In addition, other factors ended up contributing to the maintenance of the level of physical activity during the pandemic. Being male, living in a metropolitan area, and not belonging to risk groups are factors that are associated with a higher level of physical activity during the pandemic.

Importantly, comorbidities associated with physical inactivity and overweight, such as diabetes, hypertension, and cardiovascular disease, increase the likelihood of mortality in people with COVID-19 in different countries of the world[28]. A systematic review of minority groups in Europe indicated that certain ethnic groups are less active and more sedentary than the rest of the population, with gender issues recurring in the groups studied[29].

From the adjusted analysis, we observed that people with less education have a higher probability of being insufficiently active during the pandemic. On this aspect, some epidemiological surveys recently carried out in Bra-

zil, such as the National Household Sample Survey - Sports and Physical Activities (PNAD) from the Brazilian Institute of Geography and Statistics[30], the Risk Factor Surveillance System for Chronic Non-Communicable Diseases from the Ministry of Health[17], show that the practice of physical and sports activities in Brazil in periods that are not exceptional are influenced by social and economic issues, with gender, race/color, income, and education being determining factors for the access to these activities. In our study, we observed that the group with less education already presented higher chances of being insufficiently active even before the pandemic, which consequently and inevitably was enhanced in this moment of crisis.

We also found that the group that commutes less than once a month had higher chances of being insufficiently active. This relationship can be explained by the impact of working from home and the sudden change in routine caused by the pandemic. The change in routine for those who used to work and soon after started having their "own home" as the only available space - for leisure and work - forced a necessary adjustment in lifestyle, impacting the conditions for doing PA. Unlike those who are performing essential activities, which did not undergo major changes in the level of PA.

Another aspect concerns the increase in the time spent sitting at home, emerging as adverse predictors in variables of physical inactivity and sedentary behavior, causing numerous health problems, degenerative diseases, and, consequently, higher mortality rates[31]. A study on COVID-19-related hospitalizations in Brazil indicates that individuals with sufficient levels of physical activity accounted for a 34% lower prevalence of hospitalizations[32]. Univariate analyses indicate that the elderly, obese, pre-existing diseases, medication use, and being male were factors associated with a higher prevalence of hospitalization when compared to their categories of analysis.

Regarding PA behavior change, men and people aged 35-44 years and those who felt able to perform PA before the pandemic "most of the time" composed the group that significantly decreased PA practice. Regarding men, this result can be justified by the fact that this group had a greater regularity in PA practice before the pandemic, causing the actions of restrictions on the use of public and private spaces to effectively impact this regularity. Women, on the other hand, oscillated less, since 74.7% of women already referred to be insufficiently active before the pandemic, i.e., even before the pandemic this group already faced difficulties in engaging in these activities, which was enhanced with the impacts of the pandemic. According to data regarding the social distancing caused by the pandemic of COVID-19, women are considered more likely to take care of the domestic environment, lose income if they need to provide childcare during school closures, and are more exposed to increased domestic violence[33]. This characteristic can be observed in different countries, such as China, the United Kingdom, the United States, France, and Brazil, causing direct impacts on physical and mental health conditions and the maintenance of healthy habits[34].

A study about the factors that alter the self-perception of the health of Brazilians pointed out that 29.4% of the sample reported worsening physical and mental health, among them sleep problems, depression, lower back pain, associated with sedentary lifestyle mediated behaviors and poor eating habits were the main determinants in the negative perception of health during the pandemic of COVID-19[35]. Research on the impact of the pandemic on the level of physical activity and sedentary behavior in Brazilians points out that factors before social isolation (such as advanced age, chronic diseases present, and physical inactivity) had the most associated with reducing physical activity levels during the pandemic[36].

Another interesting fact is that people who reported being able to perform PA most of the time before the pandemic suffered a greater impact on this behavior. Recent studies on the motivational aspects related to PA practice warn about the importance of a paradigm shift in understanding the concept of PA and the strategies that are used to encourage the regular practice of these activities. Matias and Piggin[37] reinforce that PA is an inherently social, political, and emotional behavior, extremely complex; thus, incentives for PA practice must overcome the justifications based on blaming the subjects and the direct relationship with the disease.

The pandemic context, marked by restrictions on the use of public spaces, the closing of parks and private facilities, social isolation measures, changes in the social dynamics of work, economic instability, and strong emotional impact, influenced people's ability to move in general, even those who felt able most of the time before the pandemic. A study was applied in the North region of Brazil with the objective of analyzing the impact of social distancing recommendations during the COVID-19 pandemic on levels of physical activity practice in resident adults, observing an increase in physical inactivity behavior, a decrease in very active and active behaviors, and 59.2% of respondents became sedentary during the pandemic[38].

Janet Ige-Elegbede et al.[39], focused on a literature review of black and minority ethnic adults and older adults in the UK. The authors point to important barriers to accessing physical activity, such as long hours, lack of time, economic barriers, lack of information, language, and lack of infrastructure, as the main factors of inaccessibility to physical activity.

Matias et al.[40] strongly advocate the performance of PA, especially in exceptional moments like the present case, and they advise that during periods of social isola-

tion, it is recommended to promote and encourage the practice of physical activity in the home environment, as well as social distancing and the use of sanitary protocols, such as hand washing, mask use, and education about the importance of physical activity and the achievement of a healthy lifestyle, associating physical conditioning, balanced sleep, nutritional, and psychological monitoring.

An interesting result presented in this study was the fact that people who had close contact with or cared for a patient with Covid-19 were more likely to be insufficiently active during the period of social withdrawal, thus highlighting the great difficulties faced by Brazilians facing the care of Covid-19 and reinforcing the undeniable need for special attention from public health guidelines to encourage physical activity and exercise for the population. However, public actions that focus on these guidelines for people in different degrees of isolation during the pandemic are still incipient.

Conclusion

This study sought to analyze the reality of the city of Sao Paulo/SP regarding the involvement in physical activities during the period of social distance caused by the pandemic. Data collection was carried out in July and August of the year 2020 when the city of Sao Paulo became the epicenter of the disease in Brazil.

The data showed that approximately 55.8% of the sample was insufficiently active during the quarantine. Factors such as education, working conditions, and direct relationship to Covid-19 care were associated with decreased PA practice, directly impacting 57.6% of the sample, mainly females. People with less education, those who possibly changed their routines to working from home, and those who were directly connected to Covid cases were unable to maintain a daily routine of physical activity.

These results suggest that government policy responses to COVID-19 posed barriers to continued PA by the population. They also support the need for government encouragement of PA by the population, since PA can be an effective public health strategy with the potential to directly impact the health of those who engage in it. The data presented here can subsidize the elaboration of guidelines to face the crisis, but also future investigations on this topic, including longitudinal studies of the population, in order to corroborate the results of this study.

Limitations

This study has several limitations. First, this study surveyed a convenience sample and was limited to those with Internet access; our sample also included more females and younger age participants and therefore may not represent a country's general population. Second, IPAQ short-form and global recommendations for sufficient levels of PA account for the sum of all daily activities instead of only leisure-time PA as discussed in this research. Third, the information pre-pandemic relied on recall data from our respondents, it also may represent a bias, precluding to investigate whether physically active participants would be less likely to have decreased physical activity levels during the pandemic, as well as to infer whether participants who were insufficiently active during social isolation already were insufficiently actives prior to this period. Furthermore, the results may suffer from additional selection bias because study participants may be more interested in the topic than those who did not participate.

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