ORIGINAL ARTICLE

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Sedentary behavior and physical activity: barriers and facilitators for active behavior during the COVID-19 pandemic

Comportamento sedentário e atividade física: barreiras e facilitadores para o comportamento ativo durante a pandemia de COVID-19

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ABSTRACT

Objectives: The objectives of the present study were to assess sedentary behavior and physical activity levels before and during the COVID-19 pandemic in healthy individuals and in those with self-reported diagnosis of anxiety and/or depression, and also identify facilitators and barriers to physical activity in these populations. **Methods:** This is a cross-sectional survey based on a self-report questionnaire applied during the COVID-19 pandemic period. **Results:** In the total sample (N = 1,285) the prevalence of sedentary behavior (>8 hours/day) increased by 25% during social isolation. Social isolation increased sedentary time and decreased physical activity levels in healthy individuals and in those with self-reported diagnosis of anxiety and/or depression. In both groups, the most prevalent facilitators were supervised physical activity (before the pandemic) and activities and equipment to practice at home (during the pandemic). The most prevalent barriers were the lack of time to perform physical activities (before the pandemic) and inaccessible or distance places to practice (during the pandemic). **Conclusion:** The COVID-19 pandemic is related to an increased sedentary behavior and reduced physical activity levels. Significant changes in perceived barriers and facilitators to exercise were observed during the social isolation period.

KEYWORDS

Anxiety, coronavirus disease, depression, sedentary behavior, physical activity.

RESUMO

Objetivos: Os objetivos do presente estudo foram avaliar o comportamento sedentário e os níveis de atividade física antes e durante da pandemia de COVID-19 em indivíduos saudáveis e com diagnóstico autorreportado de ansiedade e/ou depressão e identificar os facilitadores e barreiras para a prática de atividade física nessas populações. **Métodos:** Trata-se de uma pesquisa de corte transversal baseada em um questionário de autorrelato aplicado durante o período de pandemia da COVID-19. **Resultados:** Na amostra total (N = 1.285), a prevalência de comportamento sedentário (>8 horas/dia) aumentou em 25% durante o isolamento social. O isolamento social aumentou o tempo sedentário e diminuiu os níveis de atividade física em indivíduos saudáveis, com ansiedade e/ou depressão autorreportada. Nos dois grupos, os facilitadores mais prevalentes foram a atividade física supervisionada (antes da pandemia) e as atividades e equipamentos para a prática em casa (durante a pandemia). As barreiras mais prevalentes foram a falta de tempo para realizar atividades físicas (antes da pandemia) e os locais inacessíveis ou distantes para a prática (durante a pandemia). **Conclusão:** A pandemia de COVID-19 está relacionada a aumento do comportamento sedentário e redução dos níveis de atividade física. Mudanças significativas nas barreiras percebidas e facilitadores ao exercício foram observadas durante o período de isolamento social.

PALAVRAS-CHAVE

Ansiedade, atividade física, comportamento sedentário, coronavírus, depressão.

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INTRODUCTION

A global pandemic started in March 2020, caused by the spread of the SARS-CoV-2 virus, and the new Coronavirus disease (COVID-19)[1]. In many countries and regions where community transmission has led to exponential outbreaks of COVID-19, government officials have adopted measures of social distancing to slow the spread of the virus and establish other control measures Although necessary, social isolation had a major impact on the lifestyle and mental health of thousands of people worldwide[2,3].

Due to the quarantine, the stress and anxiety levels that people are experiencing must lead to several other health-related problems[4]. Previous research on severe acute respiratory syndrome (SARS) and Ebola virus disease (EVD) has shown increased psychiatric comorbidities such as anxiety, panic attack, post-traumatic stress disorder, and depression[5,6]. The restrictive measures may affect activities of daily life directly associated with a significant reduction in habitual physical activity levels and may result in reduced sleep quality, negative emotions, cognitive distress, and aggressiveness[7]. Also, the restrictive measures may affect activities of daily life directly associated with a significant reduction in habitual physical activity levels and may result in reduced sleep quality, negative emotions, cognitive distress, and aggressiveness[7]. Social isolation can also be associated with significant negative effects on individuals' physical and mental health, such as fatigue, insomnia, fear, panic, anxiety, and stress[8].

Quarantine tends to lead to physical inactivity, contributing to sedentary behavior, obesity, cardiovascular problems, and decreased aerobic capacity[9]. Physical inactivity is a global health problem. Population-based analysis with 1.9 million participants appointed that the overall prevalence of insufficient physical activity was 7.5% in 2016 (23.4% men – 31.7% women)[10]. This scenario is even worse in the younger age group, reaching a prevalence of 80% of physically inactive individuals[11].

Physical activity can protect physical and mental health A recent meta-review demonstrated the efficacy of exercise treatment for several mental disorders[12]. According to this meta-review, physical activity decreased depressive symptoms in children, adults, and older adults and seem to be effective in anxiety symptoms compared to non-active control conditions. Otherwise, moderate to vigorous intensity show a positive impact on depressive symptoms in individuals of all ages and in several mental disorders[12].

Although physical activity has multiple mental health benefits, a major challenge that the pandemic has brought is the maintenance of a healthy and active lifestyle In a study conducted among United Kingdom residents, the authors found a negative association between moderate to vigorous physical activity in hours per day and poor mental health, suggesting that participants with higher physical activity levels during social isolation were associated with better mental health status[13]. Moreover, those who were doing much less physical activity during confinement had greater negative mood scores than those whose physical activity levels have stayed the same or improved a little[14]. A decrease in physical activity induced by quarantine was also associated with higher stress, anxiety levels and depressive symptoms[15,16].

Due to the uncertainty caused by the social isolation period, those with pre-existing mental illness can face feelings such as fear, loneliness, anxiety and depression[17]. These individuals experienced a greater increase in time spent in sedentary behavior compared to those with no history of mental illness[18]. Although higher levels of physical activity were significantly associated with lower levels of mood disturbance and associated with stronger effects on wellbeing[19], the pandemic scenario and social isolation may result in additional barriers to exercise regarding mental illness individuals. Besides, life-related risk factors such as obesity, smoke habits and cardiovascular disease can lead to physical inactivity in this population, being important barriers to engage in exercise.

There are probably additional determinants and barriers to adopting physical activity behaviors during social isolation in general population, such as feelings of anxiety, the fear about leaving the house and the restrictive government measures[20]. Considering individuals with mental illness, they can suffer from social stress factors such as lack of social connections, fear of loose the loved ones and fear of death in social isolation period[17]. Moreover, clinical and sociodemographic factors may also be associated with barriers and facilitators in mental illness populations since these individuals may have lack of health insurance, being unemployment and present small social networks[17].

Before the COVID-19 pandemic, studies pointed out several barriers toward exercise in different populations[21,22]. People's positive or negative perception of health promotion practices, such as the practice of physical activity, tends to induce certain behaviors that affect their health. The possible benefits perceived to act correspond to the anticipated perception about the positive results of health conduct[23]. Among people with mental illness, knowing theoretically based research upon the motivational processes linked to the adoption and maintenance of an active lifestyle may be helpful in understanding physical activity in this population[24].

However, there is a gap in studies evaluating barriers and facilitators during the pandemic in depressed and anxious individuals in the Brazilian context. Given the aforementioned scenario and considering the relationship between the active lifestyle and the improvement of mental health, the present study aimed to 1) Evaluate sedentary behavior and physical activity levels before and during the COVID-19 pandemic in Brazil among healthy individuals and those with self-reported diagnosis of anxiety and/or depression; 2) Identify the facilitators and barriers toward exercise in these population.

METHODS

The present study was a cross-sectional online survey. Individuals of both sexes, 18 years of age and older, residents in Brazil, were invited to participate in this study. Exclusion criteria was illiterate individuals. Participants were invited to participate via social media (Facebook, WhatsApp, Instagram) and by distributing an invitation to participate through existing researcher networks. Due to the limitations of the pandemic scenario, we adopted a snowball method to achieve a higher number of respondents. A virtual questionnaire was developed on the Google Forms platform (electronic address: https://www.google.com/intl/pt-BR/forms/about/), then, after signing the written informed consent online the participant was able to answer the multiple-choice questions. Data collections were carried out between June and August 2020. The study procedure was approved by the Psychiatry Institute, Federal University of Rio de Janeiro ethics committee (register number 31739120.0.0000.5263).

Instruments

The questionnaire was applied once and consisted of 40 questions covering demographic data, physical activity, sedentary behavior, barriers and facilitators. The questions were about participant perceptions before and during the COVID-19 pandemic. The diagnosis was self-reported through the question: "*Do you have any physical or mental illness?*".

Sedentary behavior was assessed through one question before and one question during the pandemic: How many hours the participant spent in sedentary time before the pandemic (zero to 2 hours; 2 to 4 hours; 4 to 6 hours; 6 to 8 hours; more than 8 hours). How many hours the participant spent in sedentary time during the pandemic (zero to 2 hours; 2 to 4 hours; 4 to 6 hours; 6 to 8 hours; more than 8 hours). In the statistical analysis we established a cutoff point between these response options: less than 8 hours of sedentary behavior; greater than 8 hours of sedentary behavior.

Physical activity was assessed through four questions before and four questions during the pandemic: 1) Through a multiple choice answer the participant indicated whether they practiced any type of activity and what this was. 2) Through a one choice response the participant indicated the weekly frequency of activity (1 to 3 times; 3 to 5 times; 5 to 7 times). 3) Through a one choice response the participant indicated the intensity (light; moderate; vigorous). 4) Through a one choice response the participant indicated the duration (zero to 30 minutes; 30 to 60 minutes; 60 to 90 minutes; more than 90 minutes).

Two questions about perceived facilitators to exercise were included, one covering the period before and one during the pandemic. Two questions about barriers to exercise were included, one before and one during the pandemic. All the questions presented a multiple answer option. The questions were about what characteristics of exercise the participant considered facilitator or barriers for his practice. The answers option were affirmative sentences based on the *Exercise Barriers/Benefits Scale* (*EBBS*), a Likert-type validated scale[25,26]. (Further details are included in the supplemental material). The EBBS is a scale that assesses the participant's perception of barriers and benefits for exercise. However, in our study, the answers were modified for the COVID-19 pandemic scenario and social isolation.

Self-reported mental illness diagnoses

Regarding mental illness diagnoses, the most prevalent were used. We merged the anxiety group with the depression group, turning them into a single group, called the "anxiety/depression" group. In this new group, we used both individuals who self-reported a single diagnosis of anxiety or depression and those who reported both diagnoses together (anxiety + depression). Individuals that self-reported other mental illness such as bipolar disorder and schizophrenia were excluded.

Statistical analysis

A descriptive analysis of demographic data was conducted. For assessing differences among prevalence in healthy, anxiety/depression groups, a chi-squared test was used. Moreover, to evaluate the association between mental illness and facilitators and barriers to physical activity practice before and during the pandemic, we used the healthy group as reference. Results from the logistic regression models are presented as odds ratios (ORs) and beta coefficients together with their 95% confidence intervals (CIs), respectively. The logistic regression models were adjusted for covariates sex and age. All the statistical analysis was conducted using SPSS® software version 26.0 (IBM Corporation, New York, USA).

The figures and graphs were made with the GraphPad Prism 9.0.2 software. The level of statistical significance was $p \leq 0.05$.

RESULTS

A total of 1,285 individuals were included in this study. The sample was predominantly composed of women (73.7%) and adults aged 36 to 44 years old (25.8%). The majority of the sample were married (50.8%) and living in southeast Brazil (67.3%). The average family income for this research was nine times the national minimum wage (39.6%), most of the sample had postgraduate level education (50.7%) and were in social isolation for more than 90 days (68%). Most of the sample was identified as healthy (85.7%) and among self-reported diagnoses anxiety disorder and/or depression (14.3%) were the most prevalent (Table 1).

Table 1. Demographic characteristics

Total sample	1,285
Sex	
Female	73.7%
Age group	
18-26 years	17%
27-35 years	21.1%
36-44 years	25.8%
45-53 years	17.5%
54-62 years	12.0%
63-71 years	5.6%
72-80 years	1.0%
Marital status	
Single	38.1%
Married	50.8%
Divorced	9.3%
Widowed	1.9%
Region	
Southeast	67.5%
South	19.5%
Northeast	11.2%
North	0.9%
Midwest	0.9%
Family income	
No income	0.5%
<1 minimum wages	1.7%
1-3 minimum wages	15%
3-6 minimum wages	23.4%
6-9 minimum wages	19.8%
>9 minimum wages	39.6%
Schooling level	
Complete elementary school	0.2%
Complete high school	4%
Incomplete college	14.6%
Complete college	30.5%
Postgraduate	50.7%
Time of social isolation	
>90 days	68%
Diagnosis	
Healthy	85.7%
Anxiety/Depression	14.3%

Physical activity levels and sedentary behavior before and during the COVID-19 pandemic

There was a significant increase in the prevalence of high sedentary behavior (Figure 1a) during social isolation between groups ($X^2 = 20.471$; $p = 0.001$). We observed an increase of 25% in the total sample (10% to 35%); 23% in the healthy group (10.5% to 33.5%) and 38% in the anxiety/depression group (12.5% to 50.5%).

Considering physical active practice, there was no significant difference between groups before the pandemic ($X^2 = 0.728$; $p = 0.393$) while during the pandemic we found significant difference ($X^2 = 7.199$; $p = 0.007$). The prevalence of physical activity practice (Figure 1b) decreased 16.5% in the total sample (88.2% to 71.7%); 15.5% in the healthy group (88.5% to 73%) and 23% in the anxiety/depression group (86.5% to 63.5%). We also found a pattern of reduced physical activity levels in the groups during the COVID-19 pandemic, as well as changes in the weekly frequency, session duration, and intensity of physical exercise.

In relation to physical activity frequency, before there was a significant difference between groups before the pandemic ($X^2 = 10.025$; $p = 0.018$) and during the pandemic ($X^2 = 9.237$; $p = 0.026$). The prevalence of participants performing physical activity 3 to 5 times per week (Figure 1c) decreased 22% in total sample (37.5% to 15.5%); 23% in the healthy group (39.5% to 16.5%) and 17% in the anxiety/depression group (27% to 10%).

In physical activity duration session, there was no significant differences between groups before the pandemic ($X^2 = 6.717$; $p = 0.152$) while during the pandemic a significant difference was found ($X^2 = 11.091$; $p = 0.026$). The prevalence of participants performing 30 to 60 minutes sessions (Figure 1d) in physical activities decreased in 8% in the total sample (52.5% to 44.5%); 8.5% in the healthy group (54% to 45.5%) and 6% in the anxiety/depression group (44% to 38%).

In the same way, related to physical activity intensity, there was no significant differences between groups before the pandemic ($X^2 = 1.860$; $p = 0.602$) while during the pandemic a significant difference was found ($X^2 = 10.103$; $p = 0.018$). The prevalence of participants that performed moderate to vigorous physical activity (MVPA) (Figure 1e) decrease 24.5% in the total sample (76% to 51.5%); 24% in the healthy group (76.5% to 52.5%) and 31% in the anxiety/depression group (74.5% to 43.5%).

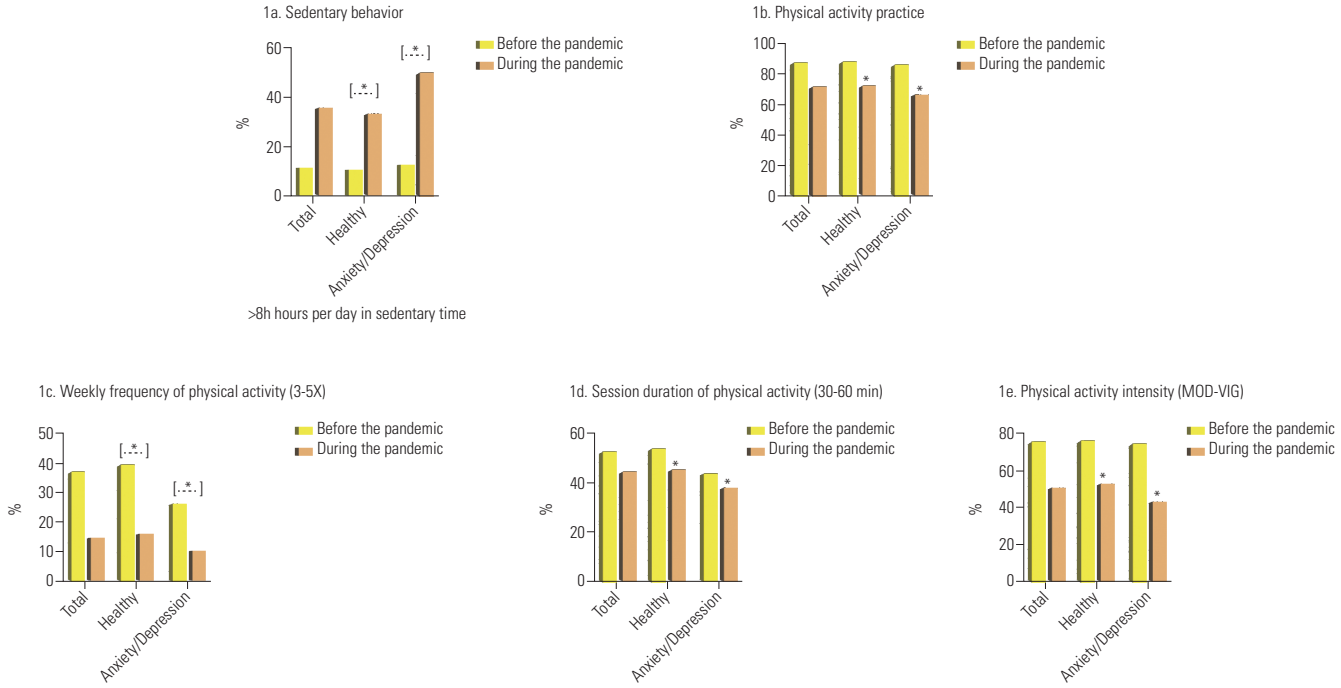

Figure 1. Physical activity information before and during the COVID-19 pandemic.

Facilitators and barriers toward exercise before the COVID-19 pandemic

Before the pandemic, the most prevalent facilitators in the total sample were: "*Professionally guided physical activity*" (67.5%), "*Outdoor activities*" (56.5%) and "*Group activities*" (41%). Moreover, the most prevalent barriers in the total sample were: "*I perceive barriers to physical activity practice*" (56.5%), "*I have no convenient schedule for physical activity*" (30.5%), and "*Physical activity takes too much time from family responsibilities*" (17%) (full detail in Table 2).

In comparison with the healthy group, people with anxiety/depression had a lower odds ratio (Table 3) to perceive "*Group activities*" as a facilitator to exercise (OR = 0.637, 95% CI 0.455-0.891; p = 0.009). In addition, in this sentence, a significant difference was found in comparison between anxiety/depression and the healthy group ($X^2 = 4.234$; p = 0.040).

Among barriers, people with anxiety/depression had a lower odds ratio to perceive "*Physical activity takes too much time from family responsibilities*" (OR = 0.543, 95% CI 0.327-0.903; p = 0.019) than healthy group. In this sentence, a significant difference was found in comparison between anxiety/depression group and the healthy group ($X^2 = 5.478$; p = 0.019). In the same way, the anxiety/depression group was at increased odds ratio to perceive "*Physical activity tires me*" (OR = 2.788, 95% CI 1.789-4.344; p = 0.001) as a barrier to exercise. Also, a significant difference was found in comparison between groups in this barrier ($X^2 = 29.229$; p = 0.001).

In comparison with the healthy group, people with anxiety/depression had a lower odds to perceive "*Places to exercise are distance or inaccessible*" (OR = 2.259, 95% CI 1.529-3.338; p = 0.001) as a barrier. In this sentence, a significant difference was found in comparison between groups ($X^2 = 21.841$; p =0.001).

In relation to the question "*I perceive barriers to physical activity practice*" a significant difference was found between groups ($X^2 = 10.915$; p = 0.001). Moreover, people with anxiety/depression were at increased odds ratio to perceive this sentence as a barrier (OR = 1.561, 95% CI 1.108-2.201; p = 0.011).

Facilitators and barriers toward exercise during the COVID-19 pandemic

During the pandemic, the most prevalent facilitators in the total sample were: "*Equipment at home for physical activity practice*" (49%), "*Space at home for physical activity practice*" (47.5%) and "*Activities at home*" (45%) (Figure 2a). While the most prevalent barriers in the total sample were: "*I perceive barriers to physical activity practice*" (75%), "*Places to exercise are distance or inaccessible*" (49.5%) and "*Physical activity is a hard work for me*" (26.5%). Changes in the prevalence of perceived facilitators and barriers to exercise can be seeing in Table 2 and Figure 2.

Regarding facilitators, people with anxiety/depression were at reduced odds ratio to perceive "*Family activities*" as facilitator to exercise (OR = 0.538, 95% CI 0.343-0.845;

Table 2. Percentage change in facilitators and barriers for exercise before and during the COVID-19 pandemic

	Healthy (N = 1,101) Before/ During	Percentage change (%)	Anxiety/Depression (N = 184) Before/ During	Percentage change (%)
Facilitators				
Activities at home	15%-45%	↑ 30%	12.5%-42.5%	↑ 30%
Space at home for physical activity practice	19.5%-47.5%	↑ 28%	22.5%-48%	↑ 25.5%
Equipment at home for physical activity practice	25%-49%	↑ 24%	31.5%-54%	↑ 22.5%
Physical activity without professionally guided	7.5%-12.5%	↑ 5%	5.5%-18%	↑ 12.5%
Family activities	14.5%-22.5%	↑ 8%	13%-13.5%	↑ 0.5%
Outdoor activities	56.5%-27%	↓ 29.5%	58%-27%	↓ 31%
Professionally-guided physical activity	67.5%-39%	↓ 28.5%	71.5%-43.5%	↓ 28%
Group activities	41%-11.5%	↓ 29.5%	33%-11%	↓ 22%
Activities with music	40%-36.5%	↓ 3.5%	46%-42%	↓ 4%
Barriers				
Places to exercise are distance or inaccessible	12%-49.5%	↑ 37.5%	25%-57%	↑ 32%
Physical activity is hard work for me	8%-26.5%	↑ 18.5%	12.5%-35.5%	↑ 23%
I perceive barriers to physical activity practice	56.5%-75%	↑ 18.5%	69.5%-83.5%	↑ 14%
I have no interest in physical activity practice	5.5%-7%	↑ 1.5%	8.5%-15%	↑ 6.5%
Physical activity tires me	7%-7.5%	↑ 0.5%	19%-11%	↓ 8%
Physical activity takes too much time from family responsibilities	17%-13.5%	↓ 3.5%	10.5%-7%	↓ 3.5%
I have no convenient schedule for physical activity	30.5%-10%	↓ 20.5%	40%-12%	↓ 28%
It costs too much money to exercise	16.5%-6.5%	↓ 10%	23%-6.5%	↓ 16.5%

Table 3. Logistic regression, facilitators, and barriers for exercise before and during the COVID-19 pandemic

	Odds Ratio (OR) Anxiety/Depression Before/During	CI (95%) Before/During	Sig. (Before/During)
Facilitators			
Outdoor activities	1.147-1.209	(0.831-1.582)-(0.839-1.743)	0.405-0.308
Professionally-guided physical activity	1.016-1.100	(0.711-1.452)-(0.797-1.518)	0.931-0.563
Physical activity without professionally guided	0.890-1.348	(0.446-1.776)-(0.881-2.064)	0.741-0.169
Group activities	**0.637***-0.836	(0.455-0.891)-(0.503-1.590)	**0.009***-0.491
Family activities	0.901-**0.538***	(0.564-1.438)-(0.343-0.845)	0.661-**0.007***
Activities with music	1.116-1.143	(0.808-1.542)-(0.826-1.582)	0.504-0.420
Activities at home	0.811-0.845	(0.505-1.301)-(0.612-1.166)	0.385-0.305
Space at home for physical activity practice	1.143-0.878	(0.769-1.667)-(0.636-1.214)	0.528-0.433
Equipment at home for physical activity practice	1.288-1.082	(0.912-1.819)-(0.784-1.492)	0.151-0.633
Barriers			
Physical activity takes too much time from family responsibilities	**0.543*-0.467***	(0.327-0.903)-(0.257-0.847)	**0.019*-0.012***
Physical activity tires me	**2.788***-1.358	(1.789-4.344)-(0.803-2.296)	**0.001***-0.254
Places to exercise are distance or inaccessible	**2.259***-1.325	(1.529-3.338)-(0.963-1.822)	**0.001***-0.084
It costs too much money to exercise	1.391-0.965	(0.944-2.050)-(0.509-1.831)	0.095-0.914
I have no convenient schedule for physical activity	1.331-1.147	(0.957-1.853)-(0.699-1.882)	0.090-0.588
Physical activity is hard work for me	1.423- 1.346	(0.867-2.334)-(0.959-1.888)	0.163-0.085
I have no interest in physical activity practice	1.385-**2.093***	(0.771-2.489)-(1.289-3.397)	0.276-**0.003***
I perceive barriers to physical activity practice	**1.561*-1.557***	(1.108-2.201)-(1.023-2.368)	**0.011*-0.039***

*Level of significance = $p \leq 0.05$. Reference group: Healthy controls; Adjusted for covariates sex and age. CI: confidence interval.

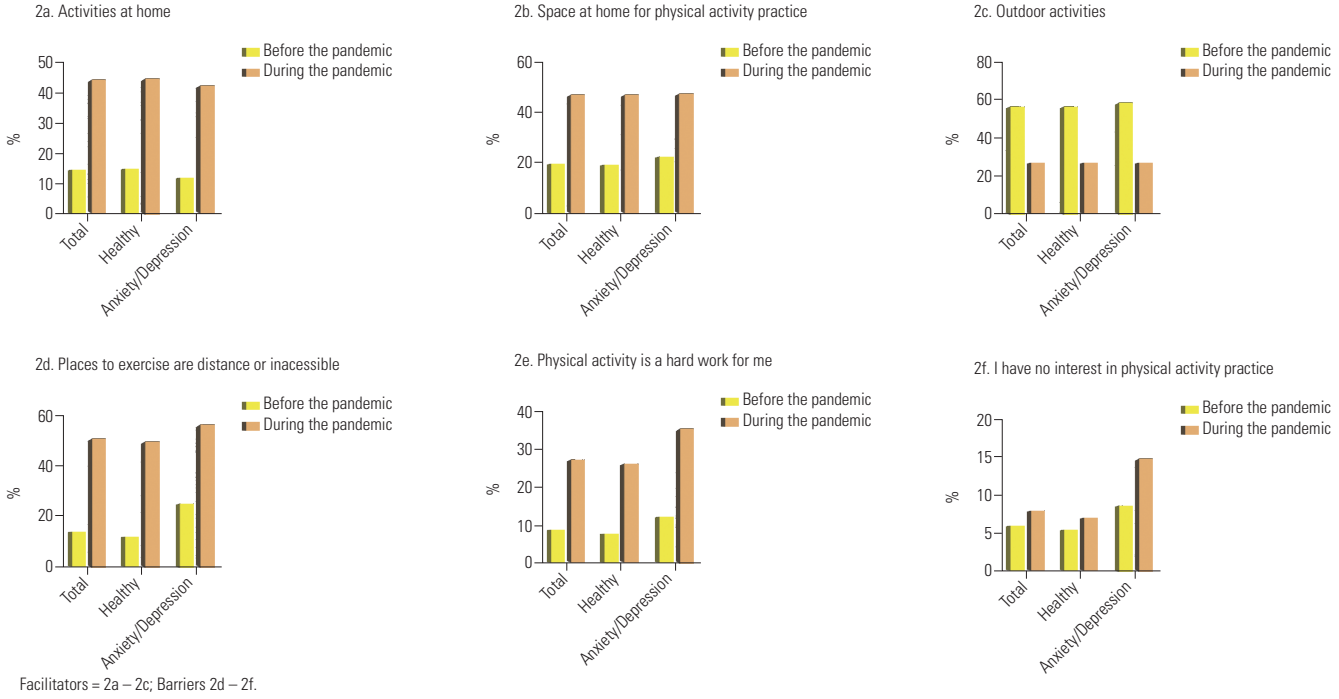

Figure 2. Prevalence of facilitators and barriers to physical activity practice before and during the COVID-19 pandemic.

p = 0,028). In this sentence, a significant difference was found in comparison between groups (X^2 = 7.190; p = 0.007).

Among barriers, a significant difference was found between groups in "*Physical activity takes too much time from family responsibilities*" (X^2 = 6.004; p = 0.014). For this sentence, people with anxiety/depression were at reduced odds to perceive as a barrier to exercise (OR = 0.467, 95% CI 0.257-0.84, p = 0.012). Also, there was a significant difference between groups in the barrier "*Physical activity is a hard work for me*" (X^2 = 6.191; p = 0.013).

In the same way, a significant difference was found between groups in the barrier "I have no interest in physical activity practice" (X^2 = 15.072; p = 0.001). The anxiety/depression group were at increased odds to perceive this sentence as a barrier (OR = 2.093, 95% CI 1.289-3.397; p = 0.003). Lastly, a significant difference was found between groups in the sentence "I perceive barriers to physical activity practice" (X^2 = 6.337; p = 0.012), being the anxiety/depression group at increased odds to perceive as a barrier (OR = 1.557, 95% CI 1.023-2.368; p = 0.039).

DISCUSSION

This study investigated changes in physical activity, sedentary behavior and perceived barriers and facilitators to exercise during the COVID-19 pandemic in Brazilian participants. Among the self-reported mental illnesses, anxiety and depression were the most prevalent in our sample. These findings are in line with the literature, since Brazil is the world leader in anxiety disorders prevalence, with 9.3% of the population affected[25]. While depression has a global prevalence of 4.4%, affecting approximately 320 million people worldwide, a prevalence of 5.8% has been reported in Brazil[27]. The majority of our sample was composed by women, highly educated and with a high-income. Compared to other groups, women were most affected during the critical pandemic period, since was exacerbate existing inequalities in the labor market, especially in middle-income countries[28].

Moreover, our findings showed a significant increase of sedentary behavior (25%) during social isolation in all participants. These data corroborate international online survey studies in the USA[29], Europe, North Africa, Western Asia, and the Americas[30]. In addition, a recent Australian study found that individuals with a first episode of psychosis had a daily mean of 11 hours of sedentary behavior and only a daily mean of 1.1 hour of walking during the pandemic[30]. In our study, the total sample also reported a decreased prevalence in physical activity during the pandemic (88.2% to 71.7%), in line with other populations[2,30,31]. Despite our sample presented high education level and income, and do not represent the general population in Brazil, similar results were found in studies conducted in Morocco and Malaysia, both lower-middle-income countries[32,33]. These findings can be due to the restrictive measures imposed by government authorities, such as limited circulation, closing

of gyms, squares, beaches, and public places to physical activity practice.

Our findings demonstrated that both groups reported decreased moderate to vigorous physical activity (MVPA) (24.5%). These results are in line with literature, that reported a decrease of 25% in moderate, a decrease by 22,7% in vigorous[30] and a decrease of 35% in MVPA during the social isolation[18]. Besides, our findings showed that both groups presented a decrease in the prevalence of session duration (30 to 60 minutes) of physical activity (22%) and in weekly frequency (3 to 5 times/week) (8%).

Despite the context imposed by social isolation, it seems that the higher the physical activity levels, the lower the odds to experience anxiety and depression symptoms during this period[15,16,34]. In the same way, higher levels of sedentary behavior increased the chances of presenting these symptoms[35]. Regarding social isolation scenario, a Brazilian study found that greater symptoms of anxiety and depression were associated with low physical activity level and low family monthly income[36].

Performing 150 minutes of MVPA per week seems to be protective for incident depression[37] and plays a role in mental health benefits. The recent findings from the COVID-19 pandemic period suggest performing 80 min of moderate or 45 min of vigorous physical activity daily improve mental and physical health[7]. These numbers are higher than in previous studies, in which 60 min of daily MVPA were recommended[38].

Facilitators toward exercise before and during the COVID-19 pandemic

Among facilitators for exercise, before confinement, individuals with self-reported diagnoses of anxiety/depression were less likely to perceive group activities as a facilitator than healthy individuals. This finding is in line with previous literature since depression symptoms severity was associated with lower experience of benefits and facilitators in social interaction[39].

Due to the restriction measures imposed by the Brazilian government circulation and exercise in outdoor environments were prohibited in many regions and cities. Our findings showed that professionally guided physical activity decreased in both groups during the pandemic period. We hypothesized that the lack of access to places where guided physical activity was performed may have affected how individuals perceived this aspect. Thereby, individuals who remained active had to exercise on their own, despite the lifestyle changes and psychological stress[14] imposed by the pandemic.

Curiously, during confinement, individuals with self-reported diagnoses of anxiety/depression had a lower risk to perceived family activities as a facilitator than the healthy group. In a study conducted before the COVID-19 pandemic, severity of depressive symptoms was associated with greater experience of barriers in family discouragement[39]. Although positive social connections with family may play an important role in the treatment of depressed people, our finding suggests that these individuals do not perceive this interaction as a facilitator to do physical activity.

Barriers toward exercise before and during the COVID-19 pandemic

Before confinement, our data suggest that individuals with self-reported diagnoses of anxiety/depression were at increased odds to perceive barriers to exercise and tiredness related to the physical activity practice, 1.5 and 2.7 times greater than the healthy group, respectively. In a recent study, the authors noted that anxious people reported concerns, negative reactions to physical sensations associated with exercise, and lack of knowledge about exercise as barriers[40].

During the social isolation, both groups began to perceive more difficulties in physical activity practice. This is in line with previous literature such as an Irish study, where individuals with established exercise habits were over two times more likely to report more exercise during pandemic than those with weaker exercise habits[41]. Also, psychological distress in individuals under quarantine may influence their daily activity and physical activity routine[4].

Furthermore, the participants that self-reported anxiety/depression were more likely to report no interest in physical activity practice compared to the healthy group (2.0 times greater) during confinement. Indeed, these individuals experience symptoms of anxiety when they think about and/or engage in exercise[40]. Considering people with depression, a cross-sectional study carried out before the COVID-19 pandemic found that physical exertion is the most perceived barrier to physical activity in this population[39]. Also, depressed individuals are more likely to not meet physical activity guidelines and perceived more barriers related to family discouragement and physical exertion[39].

During confinement, participants that self-reported anxiety/depression had a 54% lower risk of perceiving family responsibilities as a barrier than the healthy group. This result corroborates Mason and colleagues (2019) who appointed that social support is an important facilitator for this population[40]. Although staying physically active during the quarantine may contribute to physical and mental health, avoiding an inactive lifestyle during this period seems to be a challenge. Factors as environment, economic status, health

status, and local restrictions must be considered when choosing the type of physical activity to be performed, aiming to promote physical and mental health.

The present study presents some limitations. First, due to the cross-sectional nature, cause and effect cannot be determined. Second, all the data were collected using self-report questionnaires and can lead to inaccurate responses. We recognize the limitation of the subjective assessment of physical activity and sedentary behavior, when compared to objective instruments (i.e., accelerometers), since it can underestimate sedentary behavior and overestimate the level of physical activity. Third, date about life before the pandemic was assessed retrospectively and may have been susceptible to memory bias. Fourthly, participants self-identified as either healthy, or suffering from anxiety or depression, or both together. Fifth, the sample presented high-income and high education level, not covering and representing the entire Brazilian population. Also, the participants distribution through existing researcher networks should be a bias. Sixth, due to the pandemic scenario and considering the questions about physical activity and sedentary behavior levels, the lack of validation is a strong limitation of the study. Seventh, among barriers and facilitators questions, the answers options were affirmative sentences based on EBBS scale, and this procedure was not tested or validated before. Finally, due to the complex period, the lack of validation of all questionnaires and the design of the questions utilized could be a bias.

CONCLUSION

In conclusion, COVID-19 pandemic is related to an increased sedentary behavior and reduced physical activity levels in healthy and in those with self-reported diagnoses of anxiety/depression. Significant changes in perceived barriers and facilitators to exercise were observed during the social isolation period, in both groups. Anxiety/depression group were less likely to perceive family activities as facilitator, compared to the healthy group. Also, anxiety/depression group were more likely to perceived barriers to exercise and to perceived disinterest in this practice during the social isolation than healthy individuals.

INDIVIDUAL CONTRIBUTIONS

Fernanda Castro Monteiro – Conceptualization, investigation, writing original draft, data curation.
Jessica Plácido – Data analysis, data curation, review, and editing.
Felipe de Oliveira Silva – Investigation, writing, review and editing.
Juliana Dias de Lima – Writing, review, and editing.
Felipe Barreto Schuch – Writing, review, and editing.
Philip B. Ward – Writing, review, and editing.
Andrea Camaz Deslandes – Conceptualization, writing, review, and editing.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no conflict of interest to report.

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