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Sedentary behavior is associated with disability and multimorbidity in older adults during the COVID-19 pandemic: a cross-sectional survey

Comportamento sedentário é associado à incapacidade e multimorbidade em idosos durante a pandemia por COVID-19: um estudo transversal

El comportamiento sedentario se asocia con discapacidad y multimorbilidad en ancianos durante la pandemia de COVID-19: un estudio transversal

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Abstract
Objective: We described sedentary behavior during the COVID-19 pandemic in Brazilian older adults and explored whether highly sedentary behavior was associated with multimorbidity, physical activity levels, adoption of physical distancing, perceived social isolation, disability, and depressive symptoms. *Methods*: We surveyed 184 older adults and gathered information on sedentary behavior, multimorbidity, physical activity, adoption of social distancing, perceived social isolation, disability, and depressive symptoms. Then, we investigated the association between highly sedentary behavior and these factors. *Results*: 26% of participants reported high levels of sedentary behavior, spending 5 hours per day in sitting (median). Highly sedentary behavior during COVID-19 pandemic was associated with multimorbidity (OR: 2.78, 95% CI 1.12-6.89) and disability (OR: 1.08, 95% CI 1.02-1.16). *Conclusion*: The prevalence of highly sedentary behavior in older adults during the pandemic was 26%. High sedentary behavior was associated with disability and multimorbidity in them. These findings can be used to guide the academia, the public sector, and health professionals to develop integrated initiatives to monitor and to decrease sedentary behavior especially in older adults with disability and multimorbidity during and beyond the COVID-19 pandemic.
Keywords: Aged; COVID-19; Sedentary behavior; ICF.

Resumo
Objetivo: Descrevemos o comportamento sedentário durante a pandemia de COVID-19 em idosos brasileiros e exploramos se o alto comportamento sedentário estava associado à multimorbidade, níveis de atividade física, adoção de distanciamento físico, isolamento social percebido, incapacidade e sintomas depressivos. *Métodos*: Pesquisamos 184 idosos e coletamos informações sobre comportamento sedentário, multimorbidade, atividade física, adoção de distanciamento social, isolamento social percebido, incapacidade e sintomas depressivos. Em seguida, investigamos a associação entre alto comportamento sedentário e esses fatores. *Resultados*: 26% dos participantes relataram altos níveis de comportamento sedentário, passando 5 horas por dia sentados (mediana). O alto comportamento sedentário durante a pandemia de COVID-19 foi associado à multimorbidade (OR: 2,78, IC 95% 1,12-6,89) e à incapacidade (OR: 1,08, IC 95% 1,02-1,16). *Conclusão*: A prevalência de alto comportamento sedentário em idosos durante a

pandemia foi de 26%. O alto comportamento sedentário foi associado à incapacidade e multimorbidade neles. Essas descobertas podem ser usadas para orientar a academia, o setor público e os profissionais de saúde a desenvolver iniciativas integradas para monitorar e diminuir o comportamento sedentário, especialmente em idosos com deficiência e multimorbidade durante e após a pandemia de COVID-19.
Palavras-chave: Idoso; COVID-19; Comportamento sedentário; CIF.

Resumen

Objetivo: Describimos el comportamiento sedentario durante la pandemia de COVID-19 en ancianos brasileños, y exploramos si el comportamiento altamente sedentario se asoció con multimorbilidad, niveles de actividad física, adopción de distanciamiento físico, aislamiento social percibido, discapacidad y síntomas depresivos. *Métodos*: Encuestamos a 184 adultos mayores y recopilamos información sobre sedentarismo, multimorbilidad, actividad física, adopción de distanciamiento social, aislamiento social percibido, discapacidad y síntomas depresivos. Investigamos la asociación entre comportamiento altamente sedentario y estos factores. *Resultados*: 26% de los participantes reportaron altos niveles de comportamiento sedentario, pasando 5 horas por día sentados (mediana). El comportamiento altamente sedentario durante la pandemia de COVID-19 se asoció con multimorbilidad (OR: 2,78, IC 95% 1,12-6,89) y discapacidad (OR: 1,08, IC 95% 1,02-1,16). *Conclusión*: La prevalencia de comportamiento altamente sedentario en adultos mayores durante la pandemia fue de 26%. El alto sedentarismo se asoció con discapacidad y multimorbilidad en ellos. Estos hallazgos pueden usarse para guiar a la academia, el sector público y los profesionales de la salud a desarrollar iniciativas integradas para monitorear y disminuir el comportamiento sedentario, especialmente en ancianos con discapacidad y multimorbilidad durante y después de la pandemia de COVID-19.
Palabras clave: Anciano; COVID-19; Conducta sedentária; CIF.

1. Introduction

Compelling evidence suggests that older people are at the highest risk of COVID-19-related severe adverse outcomes, including hospitalization and mortality (Lima et al., 2020). To protect those deemed most vulnerable to the virus, public health recommendations and governmental measures have enforced restrictions for infection prevention and control, such as social distancing and social isolation. These measures were implemented for the Brazilian population in March 2020 (Aquino et al., 2020), including in the Northeast region. One year after the implementation of these measures, older Brazilians were still living under significant restrictions.

While the restrictions were vital to mitigate the risks of COVID-19 in older people, adoption of prolonged social distancing and isolation may result in other health issues (Ammar et al., 2020; Vieira et al., 2020). Social isolation during the pandemic has been associated with negative lifestyle changes, such as insufficient physical activity and increased sedentary times (Schrempft et al., 2019). Older people appear to be one of the most susceptible age groups to these changes (Browne et al., 2020; Yamada et al., 2020). Increased physical inactivity and sedentary behavior due to COVID-19 restrictions can potentially further deteriorate mental and physical health and increase the individual and societal burden in older people (Schrempft et al., 2019).

Sedentary behavior among older adults is a modifiable risk factor for health and an indicator of healthy ageing (Dogra et al., 2017; Wullems et al., 2016). Even prior to the COVID-19 pandemic, older people are the most inactive segment of society (Harvey et al., 2013). Sedentary behavior is defined by the time spent awake with low energy expenditure activities (<1.5 metabolic equivalent task - METs), including sitting, reclining, or lying, and it is associated with adverse health outcomes in older adults (Bankoski et al., 2011; Wullems et al., 2016). The risk of several chronic health conditions increases as the time spent in sedentary behavior increases (Patterson et al., 2018; Schrempft et al., 2019; V. D. Da Silva et al., 2019; Vancampfort et al., 2020), while being physically active promotes physical and mental health, including preventing chronic diseases and falls (Galloza et al., 2017; Handschin & Spiegelman, 2008; Hill et al., 2015; Sherrington et al., 2017).

Understanding sedentary behavior during COVID-19 pandemics is crucial to guide public health-related actions to mitigate its impact on this vulnerable age group during and beyond the pandemic. However, we are yet to fully understand the sedentary habits during the lockdown and social distancing among older people and whether this is associated with other

biopsychosocial aspects, especially in low- and middle-income areas. In this study, we aimed to describe sedentary behavior during the COVID-19 pandemic in Brazilian older adults, and explore whether multimorbidity, physical activity levels, adoption of social distancing, perceived social isolation, disability, and depressive symptoms were associated with highly sedentary behavior.

2. Methodology

Study design

We conducted a cross-sectional study and reported the results following the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Eysenbach, 2004)19 and the STROBE checklist for cross-sectional studies (Vandenbroucke et al., 2007).

Participants

Participants were recruited via social media (e.g., Instagram and WhatsApp) and email lists of research volunteers from Federal University of Ceará. Eligible respondents were community-dwelling older people aged 60 and over living in the State of Ceará, Brazil. Participants were excluded if they self-reported cognitive impairment using a screening question (Supplemental Table 1). Consent was obtained from all participants either via online or telephone-based survey. The research was approved by the research ethics committee of the Federal University of Ceará (4.210.894), and the procedures complied with the Declaration of Helsinki.

Data collection

We developed a questionnaire for this study with ad-hoc questions to collect information on sociodemographic, sedentary behavior, physical activity, psychological and social data during the COVID-19 using a 98-item survey in RedCap software. The questionnaire was developed by the research team and is detailed in the Supplemental Table. Participants were invited to complete the study survey between October and December 2020 either via telephone interview or via a self-administered online survey. To promote inclusion in research, telephone interview was offered to support participants who were unable or not confident to complete the online survey independently.

Study measures

Sedentary Behavior

Sedentary behavior was measured using the total sitting time from an adapted version of the International Physical Activity Questionnaire (IPAQ) (Benedetti et al., 2007) (Supplemental Table 1). We dichotomized responses into categories of < eight hours per day and ≥ eight hours per day (Ekelund et al., 2016). Participants with total sitting time equal or higher than 8 hours per day were classified as presenting highly sedentary behavior. We additionally included information on total television time and total screen time per day for descriptive purposes (Supplemental Table 1).

Describing the sample

Descriptive characteristics of the sample include socioeconomic and demographic factors (Supplemental Table 1): age, gender, race, marital status, living setting (remoteness), family income, reports of reduced income during the pandemic, financial assistance needed by a member of the household due to the COVID-19 pandemic, healthcare type, internet access, sleep quality, self-perceived general health (Supplementary Table 1). Additionally, we present information about confirmed COVID-19 cases.

Associated factors

We investigated the following associated factors (Supplemental Table 1)

1. Number of comorbidities was measured using the 14-item Self-administered Comorbidity Questionnaire (SCQ) (Sangha et al., 2003). Participants who reported two or more chronic conditions were categorized as multimorbidity.

2. Physical activity level was assessed using adapted questions from Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico VIGITEL (Moreira et al., 2017). Participants reporting at least 150 minutes/week of moderate to vigorous physical activity were considered sufficiently engaged in physical activity (Bull et al., 2020). Types of physical activity included aerobic, strengthening, water activities, body and mind activities or sports.

3. Adoption of social distancing was assessed using a question from the "COVID-19 behavioral research" from the Oswaldo Cruz Foundation (FIOCRUZ, 2020), an institute under the Brazilian Ministry of Health. We dichotomized responses into two categories of not staying at home versus staying at home during the pandemic.

4. Perceived social isolation during the pandemic period, through a direct question: During the period of social distancing, how often did you feel isolated from your family or close friends? (FIOCRUZ, 2020). Participants selected one response from the following options: 'never', 'somewhat', 'frequently', always. The following options were recategorized in to feeling socially isolates: 'somewhat', 'frequently', or 'always'.

5. Disability was measured using the Brazilian-Portuguese version of the 12-item World Health Organization Disability Assessment Schedule (WHODAS 2.0) questionnaire (Castro & Leite, 2017). The score from the short version ranges from 0 to 60 points, including questions related to physical and functional activities. Higher scores reflect a greater level of perceived disability.

6. Depressive symptoms were measured using the Brazilian version of the Center for Epidemiological Studies - Depression (CES-D) scale. The score ranges from 0 to 60 points, and we adopted a cut-off point of ≥16 for the presence of depressive symptoms (Batistoni et al., 2007).

Statistical analysis

We presented descriptive analysis by calculating frequencies and percentages for the categorical variables and means with standard deviations for the continuous variables. Both unadjusted and adjusted odds ratios (OR) and 95% confidence intervals (CI) are reported to investigate associations between sedentary behavior and variables of interest. First, we investigated unadjusted associations between sedentary behavior and all variables using univariate logistic regression models. Second, we included in the multivariate logistic regression models only variables that were identified in the literature (e.g. age, gender and family income) or showed a potential association with sedentary behavior in the univariate analysis ($p<0.2$). Data analyses were performed using the software Statistical Package for the Social Sciences 20.0 (SPSS, Chicago, IL, USA). We set our level of significance for ORs as $p<0.05$.

3. Results

Of the 307 individuals who accessed the first page of the survey, 240 submitted the informed consent. In total, 197 eligible respondents completed the survey (82% completion rate). Most responses were submitted via online survey (80%), with 20% completing the telephone interview. For our analysis, we included 184 older adults with complete data for sedentary behavior (Table 1). Participants' mean age was 68 (±6.8) years, mostly female (67%), who were retired or pensioners (70%) living in urban settings (92%). One out of five (20%) participants reported reduced income during the pandemic, and 13% received financial assistance. Approximately 85% of respondents reported practicing some level of social distancing and feeling socially isolated. At the time of the survey, 7% of the participants tested positive for COVID-19.

One-quarter of the responders (26%) reported highly sedentary behavior by sitting for 8 hours or more per day. The median hours spent sitting was 5 (3-8) hours per day, which is approximately 21% of sitting time per day. The median hours for daily television time per day were 3 (2–4) hours. About half (55%) of the respondents reported watching television for 3 or more hours per day. The majority of participants (63%) reported using screen time to engage with online networks for social interaction during the pandemic (e.g. Facebook). Among them, half of the participants (50%) reported being exposed to screen time for more than 3 hours per day (50.4%), while 58 (49.6%) reported being exposed to the screen for 3 hours or more per day.

Over half of participants (52%) reported some participation in physical activity during the pandemic, including aerobic (63%) and muscle-strengthening (31%) exercises. However, most total respondents (66%) did not meet the recommendations of moderate to vigorous physical activity (≥ 150 minutes/week).

Table 1 - Participant characteristics by total sample and levels of sedentary behavior.

	Total (n=184)	**Low sedentary behavior[a] (n=136)**	**High sedentary behavior[b] (n=48)**	**p-value**
Age (years), n=184 (%)				p = 0.95
Mean (SD)	68 (7)	68 (6)	68 (8)	
Gender, n=183 (%)				**p = 0.10**
Female	123 (67%)	96 (78%)	27 (22%)	
Male	60 (33%)	40 (67%)	20 (33%)	
Race, n=184 (%)				p = 0.86
Black	9 (5%)	7 (78%)	2 (22%)	
Pardo (mixed race)	89 (48%)	67 (75%)	22 (25%)	
White	86 (47%)	62 (72%)	24 (28%)	
Marital status, n=183 (%)				**p = 0.09**
Married or living with spouse	107 (59%)	74 (69%)	33 (31%)	
Living setting, n=177 (%)				p = 0.99
Urban	163 (92%)	118 (72%)	45 (28%)	
Rural	14 (8%)	14 (100%)	0 (0%)	
Family income, n=184 (%)				**p = 0.19**
< 3 minimum Brazilian reais wages	73 (40%)	58 (80%)	15 (20%)	
≥ 3 minimum Brazilian reais wages	111 (60%)	78 (71%)	32 (29%)	
Healthcare type, n=184 (%)				p = 0.56
Public health system (SUS)	58 (31%)	43 (74%)	15 (26%)	
Health insurance	90 (49%)	64 (71%)	26 (29%)	
Private health	36 (20%)	29 (81%)	7 (19%)	
Internet access, n=183 (%)				p = 0.54
Yes	151 (82%)	110 (73%)	41 (27%)	

No	32 (18%)	25 (78%)	7 (22%)	
Multimorbidity (2 or more), n=184 (%)				**p = 0.16**
Yes	108 (59%)	84 (78%)	24 (22%)	
No	76 (41%)	52 (68%)	24 (32%)	
Physical activity levels, n=183 (%)				p = 0.33
≥ 150 minutes/week	62 (34%)	43 (69%)	19 (31%)	
< 150 minutes/week	121 (66%)	92 (76%)	29 (24%)	
Social distancing adoption, n=182 (%)				**p = 0.18**
Yes	155 (85%)	117 (75%)	38 (25%)	
No	27 (15%)	17 (63%)	10 (37%)	
Perceived social isolation, n=183 (%)				**p = 0.05**
Yes	155 (85%)	110 (71%)	45 (29%)	
No	28 (15%)	25 (89%)	3 (11%)	
WHODAS score, (raw score 12–60), n=170				**p = 0.07**
Mean (SD)	19.9 (7.9)	19.0 (6.8)	22.0 (10.2)	
CES-D cut-off scores, (raw score 0-60), n= 158 (%)				p = 0.72
< 16	83 (52%)	61 (74%)	22 (26%)	
≥ 16	75 (48%)	57 (76%)	18 (24%)	
Self-perceived health, n=184 (%)				p = 0.56
Excellent, very good, good	165 (90%)	123 (75%)	42 (25%)	
Bad or very bad	19 (10%)	13 (68%)	6 (32%)	
Sleep quality, n=183 (%)				p = 0.47
Good or very good	141 (77%)	103 (73%)	38 (27%)	
Poor or very poor	42 (23%)	33 (79%)	9 (21%)	
Tested positive for COVID-19, n=184 (%)				p = 0.44
Yes	12 (7%)	10 (83%)	2 (17%)	
No	172 (93%)	126 (73%)	46 (27%)	

WHODAS= World Health Organization Disability Assessment Schedule; CES-D = Center for Epidemiological Studies Depression scale; Significant results in bold (p < 0.2)
[a] Low sedentary behavior: < 8 hours sitting time per day
[b] High sedentary behavior: ≥ 8 hours sitting time per day
Source: Authors.

Associations with sedentary behavior

Table 1 shows univariate associations between sedentary behavior and investigated factors. Highly sedentary behavior was associated ($p < 0.20$) with gender, marital status, living setting, family income, multimorbidity, social distancing, perceived loneliness, and disability. These variables were included in the multivariate model.

Results from unadjusted analysis showed that sedentary behavior was associated with multimorbidity (OR 2.61, 95% CI 1.11 to 6.15), insufficient physical activity (OR 2.7, 95% CI 1.07 to 6.82), and disability levels (OR 1.09, 95% CI 1.02 to 1.16). However, in the adjusted analysis, only multimorbidity (OR 2.78, 95% CI 1.12 to 6.89) and disability (OR 1.08, 95% CI 1.02 to 1.16) remained significant (Table 2).

Table 2 - Unadjusted and adjusted associations between sedentary behaviour and biopsychosocial factors among older people during COVID-19 in Brazil.

Sedentary behavior	**Unadjusted (n=147)**	**Adjusted[#] (n=139)**
	OR (95% CI)	**OR (95% CI)**
Age		0.85 (0.34 to 2.13)
Gender (Female)		1.28 (0.49 to 3.33)
Marital Status		1.88 (0.72 to 4.94)
Family Income		1.56 (0.63 to 3.84)
Multimorbidity	**2.61 (1.11 to 6.15)**	**2.78 (1.12 to 6.89)**
Insufficient Physical Activity	**2.7 (1.07 to 6.82)**	1.99 (0.75 to 5.30)
Social distancing adoption	1.62 (0.56 to 4.71)	1.43 (0.45 to 4.55)
Perceived social isolation	0.33 (0.09 to 1.3)	0.34 (0.08 to 1.34)
Disability	**1.09 (1.02 to 1.16)**	**1.08 (1.02 to 1.16)**
Depressive symptoms	1.75 (0.69 to 4.46)	1.65 (0.62 to 4.37)

[#] Adjusted for age, gender, income, urban living, and marital status. n: number of participants; OR: Odds ratio; CI: Confidence Interval. Significant results in bold ($p < 0.05$). Source: Authors.

4. Discussion

Statement of main findings

This study explored the sedentary behavior and associated factors in Brazilian older adults from Northeast during the COVID-19 pandemic. Participants reported high levels of sedentary behavior during the COVID-19 and the median time spent with self-reported sedentary behavior was 5 hours per day. The prevalence of sedentary activities was high where sitting time (≥8 h/d), watching television for three hours or more, or being exposed to screen time for social network purposes was 26%, 55.3% and 63%, respectively. Overall, our study shows that sedentary behavior was highly prevalent among older Brazilians and associated with multimorbidity and disability during the COVID-19 pandemic.

Comparison with other studies

Our results confirm the high prevalence of sedentary behavior in older Brazilians during the pandemic and agree with a large body of evidence highlighting the need to address sedentary behavior in the older population during and beyond the COVID-19 pandemic (Browne et al., 2020; Vieira et al., 2020). Sedentary behavior leads to significant health issues such as an increased risk for all-cause and cardiovascular disease mortality and incidence of type 2 diabetes with higher levels of sitting (6–8 h/day) and television viewing time (3–4 h/day), regardless of physical activity status (Vancampfort et al., 2020). Our

study suggests that many older Brazilians are at health risk as the median time spent with self-reported sedentary behavior was 5 hours per day, and approximately one-quarter of respondents reported having highly sedentary behavior during the pandemic outbreak. Our findings are similar to studies pre-COVID (Harvey et al., 2013, 2015), including a systematic review of 22 studies comprising 349,698 older adults that reported 5.3 hours per day of sitting time (Harvey et al., 2015).

Our findings also showed that sedentary behavior was associated with multimorbidity and disability during the pandemic. Similar findings pre-COVID were reported by the Study on Global Ageing and Adult Health (SAGE) data, which included 34,129 adults aged ≥50 years in six low- and middle-income countries (OR=1.41) (Vancampfort et al., 2017). Older adults with multimorbidity and disability are likely to be the most vulnerable to high morbidity caused by COVID-19 restrictions, which highlighted the importance of reducing time spent in sedentary behavior (Boris Cheval, et al., 2021; Vancampfort et al., 2017). As suggested by WHO 2020 guidelines on physical activity and sedentary behavior, interventions for reducing sedentary behavior in those living with chronic conditions and disabilities are recommended and highly needed (Bull et al., 2020).

We found that older adults who were highly sedentary were more disabled during the pandemic outbreak. While there are reports investigating this association in older adults, we found no study investigating the association between sedentary behavior and disability based on WHO International Classification of Functioning, Disability and Health (ICF). The literature indicates that older adults with sedentary behavior have poorer gait performance, physical fitness and cognitive functioning (Cunningham et al., 2020; Rezende et al., 2014; Schrack et al., 2019; V. D. Da Silva et al., 2019; Younan, 2018). Sedentary behavior has also been associated with frailty status (V. D. Da Silva et al., 2019). These are indeed aspects of disability, but they do not encompass all related domains. The same study using SAGE data (Vancampfort et al., 2017) also revealed that the association between multimorbidity and sedentary behavior was partially mediated by disability measured by WHODAS 2.0.

Some investigated factors were not associated with sedentary behavior. Firstly, being engaged in less than 150 minutes per week of physical activity was associated with sedentary behavior, but the association did not remain significant in the adjusted analysis. Some authors have argued that sedentary behavior and physical activity are somewhat interconnected but remain two separate phenomena (Constandt et al., 2020; Cunningham et al., 2020; Rezende et al., 2014; Schrack et al., 2019; Younan, 2018). A Belgium study found that among respondents with low physical activity levels, those who were more sedentary during the lockdown compared to before were less likely to be engaged in higher levels of exercise. Still, the authors did not investigate the influence of age in these associations (Constandt et al., 2020). Social isolation and loneliness were not associated with sedentary behavior in the multivariate analysis. We hypothesize that this might have occurred because most respondents reported being somewhat isolated during the pandemic and feeling some degree of loneliness.

This investigation brings novelty by providing information on sedentary behavior from older adults within the context of low and middle-income areas during the COVID-19 pandemic. It is estimated that three months of enforced sedentary behavior in older people would result in an additional 7000 premature deaths and result in the 'deconditioning' syndrome (Muir Gray, n.d.). Considering the prolonged months of isolation and increased emotional distress due to COVID-19 (Brown et al., 2021), it is urgent to increase awareness about their sedentary behavior, and develop interventions to reduce sedentary behavior during and after the pandemic. Our study may help policymakers and health professionals to apply the gained knowledge to design strategies to mitigate the harms of the COVID-19 enforced social isolation on sedentary behavior. Our results may inform on factors that could be approached in the battle to improve physical activity and decrease sedentary behavior in the aging population in Brazil and worldwide. Specific strategies should address older adults with disability and multimorbidity and consider inclusive interventions for those older adults less confident with technology. As the Lancet Commission on Dementia argued, we should all be ambitious about tackling preventive strategies towards modifying factors that could result in detrimental health in the ageing population (Livingston et al., 2020).

Strengths and limitations of this study

To our knowledge, this is the first study investigating sedentary behavior and associated factors in Brazilian older adults from Northeast during the COVID-19 pandemic. Our results may help policymakers and health professionals design interventions to mitigate sedentary behavior. Potential limitations of this study are that we used self-reported measures, which are prone to recall and response bias (Prince et al., 2008), and may not truly correspond to total sitting time per day or to being engaged in physical activity (F. G. Silva et al., 2020). Participants may have under or overestimated their sedentary behavior, as with any self-reported measure. Nevertheless, self-reported physical activity and sedentary behavior measures are widely used and accepted in epidemiological studies (Opdal et al., 2021; Sun et al., 2013). Importantly, we explored sedentary behavior using questions other than those related to total sitting time per day (i.e., television and screen exposure) to encompass different behaviors within this population. Selection bias is another potential limitation as we recruited participants via social media and email lists. We have also used an online survey to collect data from participants. This may have reduced the chance of participation of older people who do not have access to the internet or are less proficient with technology. Therefore, this may have reduced generalizability of our findings. To assist older people with low confidence with online surveys, we offered phone interviews and 20% of respondents preferred this option. This was an attempt to include older adults from diverse contexts into our sample. Finally, we investigated a small sample size and, as with any cross-sectional study, we were unable to infer any causal relationship between sedentary behavior and investigated variables during the COVID-19 pandemic.

5. Conclusion

Our findings revealed that sedentary behavior was highly prevalent and associated with disability and multimorbidity in older Brazilian during the COVID-19 pandemic. Strategies to reduce sedentary behavior and mitigate the potential negative effects on physical and mental health are urgently needed in the population. These findings show that academia, the public sector, physical therapists and other health professionals engaged in health promoting and rehabilitation, furthermore the community should be engaged in monitoring and developing strategies to decrease sedentary behavior among this population group in the short term.

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