FACTORS ASSOCIATED WITH SEDENTARY BEHAVIOR IN ADULTS DURING THE COVID-19 PANDEMIC

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ABSTRACT

In recent decades, sedentary behavior (SB) has come to be understood as an important public health problem. The confinement imposed by the COVID-19 has modified people's lifestyle, including increased time in SB, which is a risk factor for several health problems. In this context, the aim of this study was to analyze the association between sociodemographic, behavioral and health conditions factors with SB in adults during the COVID-19 pandemic. This is an observational and cross-sectional study that analyzed 510 Brazilians aged ≥ 18 years. Participants answered an online questionnaire containing sociodemographic, behavioral and health status information. Individuals with high SB had a lower level of physical activity (PA), higher scores of anxiety, depression

and stress, perception of poor health and health problems. In Logistic Regression, model 1 showed that being insufficiently active (OR 1.96; 95% CI: 1.31 – 2.93), having poor health perception (OR 1.67; 95% CI: 1.09 - 2.57) and having a health problem (OR 1.79; 95% CI: 1.19 - 2.68) was associated with high SB. However, for model 2, only insufficient levels of PA (OR 1.78; 95% CI: 1.15 – 2.75) and health problem (OR 1.83; 95% CI: 1.10 - 3.05) remained associated with SB. These findings highlight the importance of staying physically active and reducing SB as a strategy for health promotion.

Keywords: lifestyle; sociodemographic factors; health; sitting time; confinement

RESUMEN

Factores asociados a la conducta sedentaria en adultos durante la pandemia de COVID-19. En las últimas décadas, el conducta sedentaria (CS) ha llegado a ser entendido como un importante problema de salud pública. El confinamiento impuesto por el COVID-19 ha modificado el estilo de vida de las personas, incluido el aumento del tiempo en CS, que es un factor de riesgo para varios problemas de salud. En este contexto, el objetivo de este estudio fue analizar la asociación entre factores sociodemográficos, conductuales y de condiciones de salud con CS en adultos durante la pandemia de COVID-19. Se trata de un estudio observacional y transversal que analizó a 510 brasileños de ≥ 18 años. Los participantes respondieron un cuestionario en línea que contenía información sociodemográfica, conductual y de estado de salud. Los individuos con SB alto tenían un menor nivel de actividad física (AF), puntuaciones más altas de ansiedad, depresión y estrés, percepción de mala salud y problemas de salud. En Regresión Logística, el modelo 1 mostró que ser insuficientemente activo (OR 1,96; IC 95%: 1,31 – 2,93), tener mala percepción de salud (OR 1,67; IC 95%: 1,09 - 2,57) y tener un problema de salud (OR 1,79; IC 95%: 1,19 - 2,68) se asoció con CS alto. Sin embargo, para el modelo 2, solo los niveles insuficientes de AF (OR 1,78; IC 95%: 1,15 – 2,75) y problemas de salud (OR 1,83; IC 95%: 1,10 - 3,05) permanecieron asociados con CS. Estos hallazgos resaltan la importancia de mantenerse físicamente activo y reducir el CS como una estrategia para la promoción de la salud.

Palabras clave: estilo de vida; factores sociodemográficos; salud; tiempo sentado; encierro

INTRODUCTION

In recent decades, sedentary behavior (SB) has come to be understood as an important public health problem. The World Health Organization (WHO) characterizes the SB for activities performed in sitting, lying, or reclining positions, which do not increase energy expenditure beyond resting levels (≤ 1.5 METS), including screen time, leisure or spent on work activities (Brasil, 2021; WHO, 2020). Prolonged time in SB can be harmful to health (Semanik et al., 2015), since it increases the chances of developing cardiovascular problems (Bell et al., 2023), diabetes mellitus, dyslipidaemias, hypertension, and some types of cancer (Park et al., 2020). Social restrictions influenced by the COVID-19 pandemic impacted people's behavior changes (Condessa, Anastácio & Antão, 2021). During the pandemic, people were motivated to stay longer at home, resulting in a reduction in the time directed to physical activity (PA) and, consequently, in the increase in SB (Condessa, Anastácio & Antão, 2022; Zieff et al., 2021). In addition, the need to maintain social isolation also influenced the increase in alcohol and tobacco consumption (Schäfer et al., 2022; Stanton et al., 2020), in the development of problems related to mental health (Salari et al., 2020) and in sociodemographic aspects (Trindade & Sarti, 2021) that could relate to SB.

Although there are some studies that have analysed the relationship between lifestyle, health and social and demographic aspects with SB in the Brazilian context (Trindade & Sarti, 2021; Martins et al., 2020), it is not known of any investigation that performed a broad analysis of factors that could be related to SB during the social isolation caused by the pandemic. In addition, other viruses may emerge in the near future and trigger new pandemic contexts. Thus, the understanding of social isolation and its influence on SB would enable the development of intervention measures that would mitigate the effects of adverse behaviours on health. In this context, the aim of this study was to analyse which sociodemographic, behavioural and health conditions are associated with SB in adults during the COVID-19 pandemic.

METHODS

Study design and ethical aspects

This is an observational, cross-sectional study, an integral part of the research entitled "PHYSICAL ACTIVITY AND COVID-19: Research on Aspects of Health, Leisure, Quality of Life and Professional Activity". This study was approved by the Research Ethics Committee of the University of the State of Minas Gerais, according to protocol No. 4,131,677, and complies with the ethical principles of the Declaration of Helsinki and Resolution 466/12 of the National Health Council (Brasil, 2012).

Sample

The sample consisted of individuals living in Brazil who were 18 years of age or older. The sample calculation was performed using WINPEP software version 11.26 (Abranson, 2004), considering the 95% confidence interval (CI), 5% amplitude and 10% frequency. A 20% loss was also added, culminating in a final sample of 986 participants.

Participants were recruited by e-mail, telephone contact and/or social networks and had access to the research link, from which the Free and Informed Consent Form was presented for reading and agreement/refusal. The doubts related to the completion of the questionnaire were answered by the researcher responsible through telephone contact. Participants who presented difficulty in reading and/or writing or who did not complete the electronic form (questionnaire) were excluded from the sample.

Data collection

Due to the emergency measures of social restriction imposed by the COVID-19 pandemic, the present investigation was carried out by completing an online form. The questionnaire was adapted for individual self-application, through an online platform, and consisted of sociodemographic, behavioural and health conditions. Participants used electronic devices (mobile, tablet or computer). Data were collected between September and December 2020. Given the need to maintain social distancing, there was no restriction of environment for the completion of the questionnaire. The variables analysed were:

Sociodemographic variables

The sociodemographic variables were age, in years, and by age group (< 39 years; ≥ 39 years), gender (male; female), education (≤ 15 years; > 15 years), marital status (married/stable union; single/divorced/separated/widowed), family arrangement (lives alone; lives with others) and monthly family income (≤ 3 minimum wages; > 3 minimum wages).

Behavioural variables

PA was evaluated using the International Physical Activity Questionnaire (IPAQ), short version (Matsudo et al., 2001). The level of physical activity (LPA) was determined by the sum of vigorous PA time, multiplied by two, with moderate PA time (Armstrong et al., 2000). Total PA was presented in minutes/week. Participants were classified as insufficiently active (< 150 minutes/week) and sufficiently active (≥ 150 minutes/week) (WHO, 2020).

SB was evaluated using the IPAQ seated time domain (Matsudo et al., 2001). The total time in SB was determined by the weighted average of the time sitting on a weekday, multiplied by five, added to the sitting time of a weekend day, multiplied by two, dividing the total by seven. The total SB was presented in minutes/day. The participants were classified as low SB ($<$ P75) and high SB ($\geq$ P75), P75 $\geq$ 600 minutes/day.

Regarding alcohol consumption and smoking, the participants answered the questions: "Do you consume alcohol?" and "Do you smoke cigarettes?". For both questions, the answer was categorized as "Yes" and "No".

Health condition variables

Regarding health perception, participants answered the question "How do you see your health TODAY?" The answer was categorized as "Poor" or "Good". For the evaluation of health problems, participants were presented with a list containing several diseases/conditions that have been diagnosed by a physician. The participant should answer "No" if they did not present any health problem or "Yes", if they presented one or more health problems. Regarding the use of medications, the participant was asked: "Do you currently use medication?" (Yes or No).

The Depression, Anxiety and Stress Scale – 21 Items (DAAS-21) questionnaire has been applied to track symptoms of anxiety, depression, and stress in recent days. The questionnaire contains 21 questions subdivided into three factors: anxiety (questions 2, 4, 7, 9, 15, 19, 20); depression (questions 3, 5, 10, 13, 16, 17, 21); and stress (1, 6, 8, 11, 12, 14, 18). The response scale is a Likert type of four points, ranging from 0 (not applied in any way) to 3 (applied a lot or most of the time). In this study, the cut-off points adopted were adapted from Vignola and Tucci (2014) and participants were classified as: minimum symptoms of anxiety (0 to 7 points) or moderate to severe (≥ 8 points); minimal symptoms of depression (0 to 9 points) or moderate to severe (≥ 10 points); and minimal stress (0 to 14 points) or moderate to severe symptoms (≥ 15 points).

Body mass (kg) and height (cm) were self-reported by the participants. Body mass index (BMI) calculated using the formula BMI = body mass / (height)^2 (WHO, 2020). The participants were classified as obese, when the BMI was ≥ 30.0 kg/m^2 and non-obese, when the BMI was < 30.0 kg/m^2 (WHO, 2000).

Data analysis

The data were tabulated in Excel software. Statistical analysis was performed using Medcalc software (version 11.1.1.0). The distribution of descriptive data was performed by the Kolmogorov Smirnov test. The continuous variables were compared between the groups (low SB and high SB) by the Mann-Whitney independent sample test (nonparametric data). Categorical variables were presented in absolute and relative frequency and compared by the Chi square test. To verify the association between the variables (categorical), Logistic Regression was used in isolation (model 1 - each variable was adjusted for age) and joint (model 2 - all variables were inserted in the model). The regression results were presented in odds ratio (OR) considering the 95% CI.

RESULTS

Table 1 represents the general characterization of the participants. The sample consisted of 510 participants. When analysing the continuous variables, it was possible to notice that the group with high time in SB presented lower LPA, high time spent in sedentary activities and higher scores of anxiety, depression and stress when compared to the group with low SB. Regarding categorical variables, it was observed that the group with high SB had poor health perception and health problem.

Table 1. General characteristic of the sample, Brazil, 2020 (n = 510).

	Low SB (n = 375)	**High SB (n = 135)**	
Continuous variables			
	Median (CI 95%)	**Median (CI 95%)**	**p-value**
Sociodemographic variable			
Age (years)	30 (29 – 32)	29 (27 – 31)	0.115
Behavioural variables			
PA (minutes/week)	300 (260 – 360)	180 (103.16 – 251.83)	**< 0.001**
SB (minutes/day)	360 (343.15 – 385.71)	720 (685.71 – 723.14)	**< 0.001**
Variables of health conditions			
BMI (kg/m^2)	24.96 (24.51 – 25.5)	24.69 (23.51 – 25.43)	0.380
Symptoms of anxiety	4 (4 – 4)	6 (4 – 8)	**0.010**
Symptoms of depression	6 (4 – 8)	8 (6 – 10)	**0.032**
Symptoms of stress	14 (12 – 14)	14 (12 – 18)	**0.044**
Categorical variables			
	% (Number of Cases)	**% (Number of Cases)**	
Sociodemographic variables			
Gender (female)	65.86 (247)	62.22 (84)	0.512
Schooling (≤ 15 years of schooling)	30.4 (114)	22.96 (31)	0.125
Marital status (married/stable union)	37.6 (141)	31.85 (43)	0.276
Family arrangement (lives with others)	86.4 (324)	81.48 (110)	0.216
Monthly family income (≤ 3 minimum wages)	68.8 (258)	67.4 (91)	0.848
Behavioural variables			
Alcohol consumption (yes)	77.86 (292)	83.7 (113)	0.188
Smoking (yes)	9.6 (36)	14.07 (19)	0.202
Variables of health conditions			
Health perception (poor)	24 (90)	34.81 (47)	**0.020**
Use of medicines (yes)	30.66 (115)	37.03 (50)	0.211
Health problem (yes)	36 (135)	48.88 (66)	**0.011**

BMI - body mass index; CI – confidence interval; PA - physical activity; SB - sedentary behavior; 1 minimum wage = R$ 1039.00.

Table 2 represents the association between sociodemographic, behavioural and health conditions variables with the high time of exposure to SB. In model 1 (each variable was adjusted for age), it was possible to observe that being insufficiently active (OR 1.96; 95% CI: 1.31 - 2.93; p = 0.001), having poor health perception (OR 1.67; 95% CI: 1.09 - 2.57; p = 0.017) and having a health problem (OR 1.79; 95% CI: 1.19 - 2.68; p = 0.004) were associated with a high time in SB. However, for model 2 (all variables were included in the model), only insufficient LPA (OR 1.78; 95% CI: 1.15 – 2.75; p = 0.008) and health problem (OR 1.83; 95% CI: 1.10 - 3.05; p = 0.018) remained associated with high time in SB. In addition, it was observed that those aged 39 years or older (OR 0.55; 95% CI: 0.31 - 0.97; p = 0.040) and having 15 years or less of studies (OR 0.59; 95% CI: 0.36 - 0.98; p = 0.045) demonstrated a protective effect for high levels of SB.

Table 2. Association between sociodemographic, behavioral and health conditions variables with high sedentary behavior in adults, Brazil, 2020 (n = 510).

	Model 1			Model 2		
	OR	CI 95%	p-value	OR	CI 95%	p-value
Sociodemographic variables						
Age group						
< 39 years old		1			1	
≥ 39 years old	0.66	0.40 – 1.08	0.099	0.55	0.31 – 0.97	**0.040**
Gender						
Female		1			1	
Male	1.17	0.78 – 1.77	0.435	1.38	0.88 – 2.17	0.157
Schooling						
> 15 years of study		1			1	
≤ 15 years of study	0.63	0.39 – 1.00	0.054	0.59	0.36 – 0.98	**0.045**
Marital status						
Single/divorced/separated/widowed		1			1	
Married/stable union	0.85	0.55 – 1.33	0.501	0.92	0.55 – 1.53	0.765
Family arrangement						
Lives with others		1			1	
Lives alone	1.40	0.83 – 2.38	0.202	1.15	0.64 – 2.07	0.632
Monthly family income						
≤ 3 minimum wages		1			1	
> 3 minimum wages	1.16	0.75 – 1.79	0.492	1.21	0.75 – 1.94	0.432
Behavioural variables						
LPA						
≥ 150 minutes/week		1			1	
< 150 minutes/week	1.96	1.31 – 2.93	**0.001**	1.78	1.15 – 2.75	**0.008**
Alcohol consumption						
No		1			1	
Yes	0.68	0.40 – 1.14	0.147	0.7	0.40 – 1.20	0.198
Smoking						
No		1			1	
Yes	1.49	0.82 – 2.71	0.187	1.34	0.72 – 2.51	0.349
Variables of health conditions						
BMI						
Non-obese		1			1	
Obese	1.24	0.69 – 2.23	0.456	1	0.53 – 1.87	0.987
Symptoms of anxiety						
Minimum		1			1	
Moderate to severe	1.33	0.89 – 1.98	0.159	1.11	0.62 – 1.98	0.712
Symptoms of depression						
Minimum		1			1	
Moderate to severe	1.39	0.93 – 2.08	0.101	1.24	0.72 – 2.14	0.419
Symptoms of stress						
Minimum		1			1	
Moderate to severe	1.24	0.83 – 1.85	0.279	0.86	0.48 – 1.54	0.621
Use of medicines						
No		1			1	
Yes	1.37	0.90 – 2.07	0.137	0.94	0.55 – 1.59	0.833
Health perception						
Good		1			1	
Poor	1.67	1.09 – 2.57	**0.017**	1.33	0.80 – 2.21	0.256
Health problem						
No		1			1	
Yes	1.79	1.19 – 2.68	**0.004**	1.83	1.10 – 3.05	**0.018**

BMI - body mass index; CI – confidence interval; LPA - level of physical activity; OR - odds ratio; SB - sedentary behavior. Model 1 - each variable was adjusted for age, except age. Model 2 - all variables were inserted simultaneously into the model. 1 minimum wage = R$ 1039.00

DISCUSSION

This study evidenced the behavioural, sociodemographic and health conditions that were associated with SB in Brazilian adults. We found that insufficient levels of PA, poor health perception and health problems were associated with high time in SB. In addition, being 39 years of age or older or having low schooling presented as a protective factor for high SB.

Regarding the variables related to lifestyle, only PA was associated with SB. In the age-adjusted analysis, it was possible to verify that insufficiently active individuals had a 1.96 times greater chance of presenting high SB when compared to sufficiently active individuals. When verifying the association between LPA and SB adjusted for all variables of the model, it was found that the chance of presenting high SB was 1.78 times higher for insufficiently active individuals.

Corroborating these findings, a study that analysed Brazilian adults through data from the Surveillance of Risk and Protective Factors for Chronic Diseases by Telephone Survey identified that the practice of PA was a protective factor for SB (Trindade & Sarti, 2021). During the 24 hours of the day, an adult individual can perform different types of activities that involve sleep time, the practice of PA at different intensities, and also the time spent at SB. Therefore, considering that there is no change in sleep time, by reducing the practice of PA, consequently there will be an increase in time in SB. Moreover, the emergency measures imposed by COVID-19 resulted in the closure of public spaces for PA and led people to stay longer at home, performing sedentary activities.

Regarding health conditions, it was possible to notice that the perception of poor health and health problems were associated with high SB. It is well established in the literature that excess SB causes health damage (Bell et al., 2023; Park et al., 2020). This is because prolonged time directed to sedentary activities is configured as a stressing mechanism that decreases muscle action and increases insulin resistance, resulting in increased body fat (Charansonney, 2011). Therefore, the stressor response generated by SB can increase risk factors for the development of chronic diseases, directly influencing the health of individuals.

When analysing the sociodemographic variables, it was possible to verify that being aged 39 years or older or having low schooling presented as a protective factor for high SB. From a study that analysed 8,471 individuals, it was possible to notice that younger adults with higher schooling had higher total SB (Bakker et al., 2020). Similarly, a study involving 200 adults aged between 20 and 59 years identified that people with higher education had longer time in SB and screen time (Martins et al., 2020). It is common to observe that younger adults with higher schooling direct an expressive period of the day performing work activities that require less physical effort and greater intellectual expenditure, especially in order to achieve professional stability. Therefore, the time available for the practice of PA becomes compromised, yielding space for the development of activities that involve lower energy expenditure.

On the other hand, in this study, no statistically significant associations were observed between alcohol consumption and smoking with SB, which differs from the literature (Trindade & Sarti, 2021). In addition, the variables obesity, medication consumption, symptoms of anxiety, depression or stress, gender, income, marital status and family arrangement were not associated with high SB. It is important to highlight that the absence of association between these variables could be explained by the specific characteristics of the sample investigated and also by the sociocultural aspects inherent to individuals living in different regions of the country.

Despite the important contribution of this study in the epidemiological context, regarding the understanding of the factors that contributed to the increase in time in sedentary behavior in Brazilian adults during the COVID-19 pandemic, some limitations need to be highlighted. The design of this investigation does not allow establishing a causal relationship between the variables. Moreover, although the study analysed people living in several states of the country, it was not possible to evidence a representative sample, by region, which makes it difficult to generalize the findings for the entire Brazilian population.

CONCLUSION

This study was conducted an atypical period, regarding Public Health, since the restrictions imposed by the COVID-19 pandemic had a severe impact on people's lives, especially in the increase of time in SB. The findings of this investigation allowed the understanding of the main aspects that were related to SB.

It was evidenced that insufficiently active individuals with poor health perception and who had a health problem were more likely to have a high time in SB. In addition, being 39 years of age or older or having low schooling were observed as a protective factor for the high time spent in sedentary activities.

In view of these findings, it is necessary to encourage people to remain physically active and reduce the time in SB, which would allow the reduction of health problems and, consequently, the burden that these behaviours cause to public coffers. In addition, the importance of further studies in contexts like the COVID-19 pandemic is highlighted. This could help to understand the factors that relate to SB in order to design strategies that reduce the adverse impact of this problem in future situations.

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CONFLICTO DE INTERESES

Los autores declaran no tener ningún conflicto de intereses y que han participado activamente por ambas partes en la elaboración del manuscrito.