ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 13, Issue, 06, pp. 63053-63061, June, 2023
https://doi.org/10.37118/ijdr.26749.06.2023

RESEARCH ARTICLE OPEN ACCESS

PHYSICAL ACTIVITY LEVEL AND SEDENTARY BEHAVIOR AND ASSOCIATED PREDICTORS AMONG UNIVERSITY PROFESSORS DURING THE PANDEMIC PERIOD BY COVID-19

[1,*]Gizela Pedrazzoli Pereira and [2]Catarina Maria Gomes Duarte da Silva

[1]Faculty o f Physiotherapy, Universityof Rio Verde
[2]Faculty of Human Kinetics, University of Lisbon

ARTICLE INFO

Article History:
Received 11th April, 2023
Received in revised form
17th April, 2023
Accepted 20th May, 2023
Published online 30th June, 2023

KeyWords:

Sedentarybehavior;
Exercicepsysique;
Universityprofessor.

****Corresponding author:***
GizelaPedrazzoli Pereira

ABSTRACT

Introduction: Physical activity and sedentary behavior play crucial roles in human development and public health. Understanding the factors associated with these behaviors is essential, particularly in specific populations such as university professors. This study aimed to examine the prevalence of sedentary behavior and physical activity levels among university professors and identify associated factors. ***Method:*** This cross-sectional study included professors from two universities in Goiás, Brazil. Data were collected using an online questionnaire and the International Physical Activity Questionnaire (IPAQ-bref) to assess physical activity levels. Sedentary behavior was evaluated based on the time spent sitting on weekdays. Sociodemographic, work-related, clinical, and lifestyle variables were collected. Descriptive analyses, chi-square tests, and logistic regression analyses were conducted to analyze the data. ***Results:*** Among the 152 professors analyzed, 62.5% were classified as insufficiently active, whereas 37.5% were considered active. Regarding sedentary behavior, 23% reported sitting for 6 h or less, while 77% reported sedentary behavior. Factors associated with physical activity levels included body mass index, presence of acute or chronic diseases, teaching time, sleep quality, and musculoskeletal pain. Factors associated with sedentary behavior included body mass index, teaching time, area of work, and alcohol intake. ***Conclusion:*** This study revealed a high prevalence of insufficient physical activity and sedentary behavior among university professors. Several factors such as BMI, teaching time, and lifestyle variables were associated with these behaviors. These findings emphasize the need for interventions to promote physical activity and reduce sedentary behavior among university professors, especially during the COVID-19 pandemic.

Citation: ***GizelaPedrazzoli Pereira and Catarina Maria Gomes Duarte da Silva. 2023.*** "Physical activity level and sedentary behavior and associated predictors among university professors during the pandemic period by covid-19". *International Journal of Development Research*, 13, (06), 63053-63061.

INTRODUCTION

Physical activity and sedentary behavior are life habits that influence human development and should be analyzed as an indicator of public health actions that need to be based on recommendations, such as the guidelines of the World Health Organization (WHO), with the aim of offering significant health benefits and mitigating the risks of developing chronic non-communicable diseases (WHO, 2020). It is evident that there are some barriers and difficulties for promoting physical activity and reducing sedentary behavior, especially in certain population groups, which demonstrates the need to understand the factors associated with these behaviors in these specific populations.

Teaching, as much as it presents itself as a socially relevant profession, is often affected by several factors, including excessive workloads, underapreciated profession, unsatisfactory working conditions, related to the conjuncture and structure of institutions. These can all contribute to the low level of physical activity and the high amount of time devoted to sedentary behavior due to the consequences of the various exposure factors (Santos et al., 2018). Aguilar et al., (2008) carried out a survey that evaluated a group of university professors and demonstrated a prevalence of 45.5% of professors presenting sedentary behavior. Saraiva et al. (2018) identified the low level of physical activity among university professors and factors of social and demographic levels associated with this problem.

However, it is important to emphasize that there are still few studies that evaluate these behaviors in the Brazilian context and that, despite the cited studies evaluating the level of physical activity and sedentary behavior among university professors, the evaluated samples are relatively small. In this sense, current information is required on the levels of physical activity and sedentary behavior and the factors associated with these behaviors. Factors related to the individual level, such as biological, psychological and behavioral, are being evaluated together with social, environmental and political factors, which demonstrate influence in the adoption of behaviors related to the practice of physical activity and sedentary behavior (Rhodes et al., 2012; Seefeldt et al., 2002). A study, which evaluated 163 university professors in Brazil, showed that among the factors associated with a low level of physical activity were a lower consumption of greens/vegetables/fruits, excessive alcohol consumption and a worse perception of health (Santana; Peixoto, 2017). A systematic review evaluated the factors associated with sedentary behavior among adults aged 18 to 65, found that age, body mass index, economic status and mood conditions emerged from the analyzed studies as the main explanatory factors for the presence of sedentary behavior (O'Donoghue et al., 2016). In view of this, it is significantly important to investigate, among university professors, the prevalence of sedentary behavior and levels of physical activity and to identify the factors that may be associated, aiming to address this health problem in a preventive manner, following WHO guidelines (WHO, 2020). In addition, the present study demonstrates significant importance, also due to the fact that the evaluation of teachers was carried out during the COVID-19 pandemic period, which may result in risk factors for low levels of physical activity and sedentary behavior, due to the social restrictions and the need for telework. Therefore, the objective of the present research is to identify the prevalence of the level of physical activity and sedentary behavior of university professors and the associated predictors.

METHODOLOGY

This is an observational, descriptive, analytical study classified as a cross-sectional study, with a snapshot sample of professors linked to two universities located in the state of Goiás - Brazil. The sample of participants was recruited online through an invitation sent via email during the month of October 2020. The population of professors who worked in both institutions during the data collection period was 508 professors and responses were obtained from 239 participants, however, the final sample consisted of 220 professors due to the exclusion of missing data. The flowchart of the analyzed sample is presented in Figure 1. The sample calculation was performed taking into account 35 independent variables, the expected effect of 0.35 and 80% power to estimate the difference between 2 proportions with 95% confidence level, resulting in a minimum sample of 110 participants. Data collection was performed using a digital platform and the questionnaires were transferred to the online platform. A pilot test was carried out with 36 professors to verify and refine the comprehensibility of the research instruments used. Professors from two universities with a minimum of six months of teaching were included in this study. Professors who reported having some type of physical limitation or that there were missing data from the instrument used were excluded from this analysis. This research followed all ethical precepts and was approved by the Research Ethics Committee with CAAE number: 28450819.2.0000.5077.

Dependent variables: Physical activity level was assessed using the International Physical Activity Questionnaire (IPAQ-*bref*) validated for Portuguese by(Matsudo et al., 2001). The IPAQ-*bref* has six questions to assess the level of physical activity and considers the period relative to the previous week. A measure of physical activity can be calculated by weighting each type of activity by its defined energy requirements in METs. METs are multiples of the resting metabolic rate, calculated by multiplying the MET score of an activity by the minutes performed. Scores in MET minutes equate to kilocalories for a 60 kg person, and kilocalories can be calculated from MET minutes.

To obtain the total number of total METs minutes per week that the participant reached, add up all the METs minutes of the days of physical activity practice. The questionnaire data allowed for the categorization of physical activity into three levels: Insufficiently Active, Active and Very Active. However, the results of this research resulted in university professors being categorized as Insufficient and Active. Professors categorized in the Insufficient level of physical activity did not report any practice or the reported activity did not meet any of the recommendation criteria regarding frequency and duration.

Professors who complied with the following recommendations were categorized as Active:

- 3 or more days of vigorous activity of at least 20 minutes a day, or
- 5 or more days of moderate-intensity activity and/or walking at least 30 minutes a day, or
- 5 or more days of any combination of walking, moderate-intensity, or vigorous-intensity activities, achieving a minimum of 600 MET-minutes/week.

Sedentary behavior was assessed using a specific question in the IPAQ-*bref* that refers to the time spent awake in a sitting or reclining position watching TV, or using a smartphone, or playing video games, studying or working during a weekday. For this research, the cutoff point was established at 6 hours a day, which appears to be a reference in several studies (Stamatakis, Ekelund, et al., 2019; Stamatakis, Gale, et al., 2019).

Independent variables: Data from independent variables were collected from a questionnaire that addressed questions related to sociodemographic, work, clinical, lifestyle and work variables. Socio-demographic variables: age (≤ 50 years or > 50 years), gender (male or female), body mass index (normal weight, overweight, moderate/severe obesity), marital status (with or without a partner), dependents (with or without dependents). Work variables: teaching time (years), area of activity (health and other areas), working period (one, two or three periods), telework (yes or no), weekly workload (hours), difficulty with schedule (never/rarely; infrequent; frequent or very frequent/always), absence from work in the last 12 months (no or yes), employment relationship (tenured or hired), negative influence of work on daily life (nothing/ almost nothing; a little; moderately or a lot/extremely), negative influence of time spent at work (nothing/almost nothing; a little; moderately or a lot/extremely), perception of family members about overwork (nothing/almost nothing ; a little; moderately or a lot/extremely) and doing work sitting down (always/almost always; very often; sometimes or never/infrequently) and doing work standing up (always/almost always; very often; sometimes often or never/rarely). Clinical variables: existence of any acute or chronic disease (no or yes), neck pain, upper back pain (no or yes), lower back pain (no or yes), shoulder pain (no or yes), elbow pain (no or yes), wrist/hand pain (no or yes), hip/thigh pain (no or yes), knee pain (no or yes), ankle pain (no or yes). Habits and lifestyle variables: tobacco consumption (non-smoker/former smoker; smoker), alcohol intake (does not consume; less than 15 cups per week or 15 cups or more per week), coffee consumption (cups), performing housework (never; rarely/sometimes or often/always), average daily sleep time (hours), sleep quality (very good; good; poor or very poor).

Data analyses: Descriptive analyses were performed with absolute and relative frequencies of the variables of interest. For comparison of categorical variables between groups of interest, chi-square analyses were performed or when the test assumption was not reached, Fisher's exact test was used. For analyses of the effect size of the association between categorical variables, Cramer's V was used. For the comparison between the groups of continuous variables, analyses of the non-parametric Mann-Whitney U test were performed. Crude logistic regression analyses (odds ratio) were carried out to verify to what extent the level of physical activity (insufficient or active) and sedentary behavior (absent or present) could be adequately predicted

by sociodemographic, work, clinical and lifestyle variables, with the respective 95% confidence intervals (CI). After verifying the crude analyses, the variables that had a significance level of $p < 0.05$ were inserted in the adjusted regression model to control possible confounding variables. All variables were inserted into the model (enter) and adjusted to each other. Associations with physical activity level and sedentary behavior were considered statistically significant when p values were equal to or less than 0.05. The assumptions for carrying out the regression analyses were met and analyzed by the tolerance values and the variance inflation factor (VIF). Analyses were performed using the SPSS Statistics program (Statistical Package for the Social Sciences) version 24.

RESULTS

The total sample includes 220 university professors. 39 professors with some type of physical limitation and 29 professors with missing data from the IPAQ instrument were excluded from the analyses of this article, resulting in a central analytical sample size of 152 university professors (Figure 1).

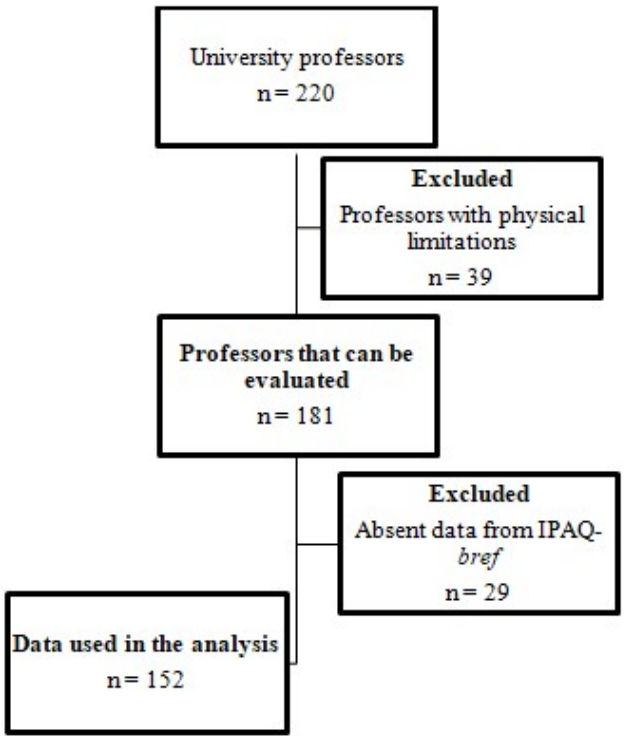

Fig. 1. Sample definition flowchart

Regarding the prevalence of physical activity, 95 (62.5%; 95%CI 54.6 – 69.7) professors were classified as having an insufficient level of activity and 57 (37.5%; 95%CI 30.3 – 45, 4) were considered active. Sedentary behavior was assessed by the period of time that teachers remain seated during weekdays and in the present sample, 35 (23%; 95%CI 16.4 - 29.6) reported sitting for 6 hours or less, thus characterizing the absence of sedentary behavior and 117 (77%; 95%CI 70.4 – 83.6) had the behavior of sitting during the week for 6 hours or more, being categorized as sedentary. In Table 1, we see that BMI was associated with the level of physical activity ($\chi2(3) = 11.11$, $p = 0.007$; Cramer's $V = 0.271$) and the analyses of the adjusted residuals (Table 2) showed that professors with insufficient level of activity were moderately/severely obese. The analyses of having dependents in the family context ($\chi2(1) = 14.37$, $p < 0.001$; Cramer's $V = 0.310$) and some acute or chronic disease ($\chi2(1) = 8.20$, $p < 0.004$; V of Cramer = 0.233) associated with the level of physical activity. The average years in teaching was significantly different between the groups of teachers ($U = 1973$; $p = 0.030$; $r = 0.18$) in which active teachers had less teaching time when compared to teachers with an insufficient level of activity ($M = 9.98 < M = 12.6$). Sleep quality was significantly associated with activity level ($\chi2(3) = 16.62$, $p = 0.001$; Cramer's $V = 0.338$), in which active professors reported a higher proportion of very good sleep quality. Associations were also found between the level of physical activity and neck pain ($\chi2(1) = 4.64$, $p = 0.031$; Cramer's $V = 0.175$) and lower back pain ($\chi2(1) = 12, 05$, $p = 0.001$; Cramer's $V = 0.282$), verifying a higher proportion of reports of these conditions in professors with an insufficient level of physical activity. The variables related to the perception of energy expenditure at work ($\chi2(3) = 8.83$, $p = 0.032$; Cramer's $V = 0.241$) and time ($\chi2(3) = 14.32$, $p = 0.002$; Cramer's $V = 0.307$) at work negatively affecting the lives of professors, was associated with the level of activity, in which professors with an insufficient physical activity level reported that these two factors negatively affect their lives in a moderate way (TABLE 1). Table 1 also presents the associations between sedentary behavior and the independent variables. The analyses showed a significant association between the BMI classification ($\chi2(3) = 10.82$, $p = 0.009$; Cramer's $V = 0.268$) and sedentary behavior, with sedentary professors having a BMI, globally, higher. Teaching time was significantly different between groups ($U = 1353$; $p = 0.014$; $r = 0.20$) where professors with present sedentary behavior had a longer career ($M = 12.3$; ±7.83) when compared to those without sedentary behavior ($M = 9.18$; ±7.06). Associations were also observed in the area of work ($\chi2(1) = 9.18$, $p = 0.002$; Cramer's $V = 0.246$) and with the intake of alcoholic beverages ($\chi2(2) = 7.28$, $p = 0.026$; Cramer's $V = 0.219$), with a higher proportion of alcohol-consuming professors among the sedentary. There is also an association with lower back pain ($\chi2(1) = 4.42$, $p = 0.035$; Cramer's $V = 0.171$), hip/thigh pain ($\chi2(1) = 7.42$, $p = 0.016$; Cramer's $V = 0.221$), family perception of overwork ($\chi2(3) = 10.97$, $p = 0.010$; Cramer's $V = 0.291$), and the behavior of working sitting down ($\chi2(3) = 28.89$, $p < 0.001$; Cramer's $V = 0.440$). Average daily sleep time differed ($U = 1507$; $p = 0.012$; $r = 0.19$) between groups.

As shown in Table 2, the factors associated with the insufficient level of physical activity were, in the BMI classification, being moderately/severely obese (OR = 5.75; 95%CI 1.76 – 18.71), having dependents in the family (OR = 3.75; 95%CI 1.86 – 7.54), reporting some acute or chronic disease (OR = 2.67; 95%CI 1.35 – 5.28) deficits in sleep quality, especially poor sleep quality (OR = 8.66; 95%CI 1.67 – 44, 94), reporting pain in the neck (OR = 2.33; 95%CI 1.06 – 5.09) and lower back pain (OR = 3.89; 95%CI 1.75 – 8.59). A moderate perception of the negative influence of work on private life (OR = 4.76; 95%CI 1.57 – 14.40) and a moderate negative influence of time dedicated to work (OR = 5.34; 95%CI 1.62 – 17,21) were also associated with insufficient level of physical activity. Regarding sedentary behavior, the variables associated with it were being overweight according to BMI (OR = 3.26; CI95% 1.29 – 8.23) teaching time (OR = 1.06; CI95 % 1.00 – 1.13), the professor belonging to other areas of expertise (OR = 3.30; 95%CI 1.49 – 7.29), the average daily sleep time (OR = 1.46; 95%CI % 1.04 – 2.05), lower back pain (OR = 2.59; 95%CI 1.05 – 6.42) and also the perception of the negative influence of work on private life (OR = 4, 55; 95%CI 1.16 – 17.82) and time in work activities (OR = 5.07; 95%CI 1.39 – 18.45). Added to this, all categories of the variable that verifies the perception that the professor's family has about overwork and a high frequency of work sitting down (OR = 35.76; 95%CI 3.86 – 330.69) were associated with a greater chance of the presence of sedentary behavior.

Table 3 presents the adjusted logistic regression analyzes for the significant variables ($p < 0.05$) in the crude analyses. The insufficient level of physical activity was associated with moderate/severe obesity (OR = 5.09; 95%CI 1.28 – 20.21), with the presence of a dependent in the family (OR = 3.29; 95%CI 1.24 – 8.45), with pain in the lower back (lumbar) (OR = 4.14; 95%CI 1.44 – 11.86) and with the perception that work requires excessive time that affects private life (OR = 21.97; 95%CI 1.35 – 356.30).

Table 1. Frequency and association between levels of physical activity and sedentary behavior according to sociodemographic variables, work aspects, clinical aspects and lifestyle habits in university professors in the Brazilian Midwest (N = 152)

Acute or chronic disease				0,004[a]			0,845[a]
No	60 (39,7)	29 (48,3)	31 (51,7)		14 (23,3)	46 (76,7)	
Yes	91 (60,3)	65 (71,4)	26 (28,6)		20 (22)	71 (78)	
Tobacco consumption				0,024[b]			0,547[b]
Non-smoker/ex-smoker	149 (98)	95 (63,8)	54 (36,2)		34 (22,8)	115 (77,2)	
Smoker	3 (2)	0 (0)	3 (100)		1 (33,3)	2 (66,7)	
Alcoholic beverage consumption				0,572[a]			0,026[a]
Does not consume	66 (43,4)	44 (66,7)	22 (33,3)		13 (19,7)	53 (80,3)	
Less than 15 cup per week	47 (30,9)	29 (61,7)	18 (38,3)		17 (36,2)	30 (63,8)	
15 cups or more per week	39 (25,7)	22 (56,4)	17 (43,6)		5 (12,8)	34 (87,2)	
Coffee consumption in cups – average	152	2	2	0,531[c]	2	2	0,411[c]
Housework				0,722[a]			0,280[a]
Never	18 (11,8)	12 (66,7)	6 (33,3)		4 (22,2)	14 (77,8)	
Rarely/sometimes	89 (58,6)	57 (64)	32 (36)		17 (19,1)	72 (80,9)	
Often/always	45 (29,6)	26 (57,8)	19 (42,2)		14 (31,1)	31 (68,9)	
Average daily sleep time in hours – average (dp)	152	7,03 (±1,21)	7,18 (±0,94)	0,417[c]	6,71 (±0,98)	7,20 (1,14)	0,012[c]
Sleep quality				0,001[b]			0,450[b]
Very good	41 (27)	15 (36,6)	26 (63,4)		12 (29,3)	29 (70,7)	
Good	73 (48)	50 (68,5)	23 (31,5)		15 (20,5)	58 (79,5)	
Bad	26 (17,1)	20 (76,9)	6 (23,1)		7 (26,9)	19 (73,1)	
Very bad	12 (7,9)	10 (83,3)	2 (16,7)		1 (8,3)	11 (91,7)	
Neck pain				0,031			0,066[a]
No	107 (70,4)	61 (57)	46 (43)		29 (27,1)	78 (72,9)	
Yes	45 (29,6)	34 (75,6)	11 (24,4)		6 (13,3)	39 (86,7)	
Upper back pain				0,090[a]			0,874[a]
No	129 (84,9)	77 (59,7)	52 (40,3)		30 (23,3)	99 (76,7)	
Yes	23 (15,1)	18 (78,3)	5 (21,7)		5 (21,7)	18 (78,3)	
Lower back pain				0,001[a]			0,035[a]
No	99 (65,1)	52 (52,5)	47 (47,5)		28 (28,3)	71 (71,7)	
Yes	53 (34,9)	43 (81,1)	10 (18,9)		7 (13,2)	46 (86,8)	
Shoulder pain				0,215[a]			0,165[b]
No	132 (86,8)	80 (60,6)	52 (39,4)		33(25)	99 (75)	
Yes	20 (13,2)	15 (75)	5 (25)		2 (10)	18 (90)	
Elbow pain				0,485[b]			1,00[b]
No	143 (94,1)	88 (61,5)	55 (38,5)		33 (23,1)	110 (76,9)	
Yes	9 (5,9)	7 (77,8)	2 (22,2)		2 (22,2)	7 (77,8)	
Pain in the wrists/hands				0,726[a]			0,749[b]
No	137 (90,1)	85 (62)	52 (38)		31 (22,6)	106 (77,4)	
Yes	15 (9,9)	10 (66,7)	5 (33,3)		4 (26,7)	11 (73,3)	
Hip/thigh pain				0,711[b]			0,016[b]
No	144 (94,7)	89 (61,8)	55 (38,2)		30 (20,8)	114 (79,2)	
Yes	8 (5,3)	6 (75)	2 (25)		5 (62,5)	3 (37,5)	
Knee pain				1,00[b]			1,00[b]
No	143 (94,1(	89 (62,2)	54 (37,8)		33 (23,1)	110 (76,9)	
Yes	9 (5,9)	6 (66,7)	3 (33,3)		2 (22,2)	7 (77,8)	
Ankles/feet pain				0,474[b]			0,682[b]
No	144 (94,7)	91 (63,2)	53 (36,8)		34 (23,6)	110 (76,4)	
Yes	8 (5,3)	4 (50)	4 (50)		1 (12,5)	7 (87,5)	
Negative influence of work on private life				0,032[a]			0,071
Nothing/almost nothing	22 (14,5)	9 (40,9)	13 (59,1)		7 (31,8)	15 (68,2)	
A little	57 (37,5)	33 (57,9)	24 (42,1)		17 (29,8)	40 (70,2)	
Moderately	43 (28,3)	33 (76,7)	10 (23,3)		4 (9,3)	39 (90,7)	
A lot/extremely	30 (19,7)	20 (66,7)	10 (33,3)		7 (23,3)	23 (76,7)	
Negative influence of working time				0,002[a]			0,076[a]
Nothing/almost nothing	20 (13,2)	9 (45)	11 (55)		8 (40)	12 (60)	
A little	55 (36,2)	27 (49,1)	28 (50,9)		13 (23,6)	42 (76,4)	
Moderately	43 (28,3)	35 (81,4)	8 (18,6)		5 (11,6)	38 (88,4)	
A lot/extremely	34 (22,4)	24 (70,6)	10 (29,4)		9 (26,5)	25 (73,5)	
Family perception of overwork				0,080[a]			0,010[a]
Nothing/almost nothing	13 (8,6)	6 (46,2)	7 (53,8)		8 (61,5)	5 (38,5)	
A little	32 (21,1)	15 (46,9)	17 (53,1)		8 (25)	24 (75)	
Moderately	45 (29,6)	31 (68,9)	14 (31,1)		9 (20)	36 (80)	
A lot/extremely	62 (40,8)	43 (69,4)	19 (30,6)		10 (16,1)	52 (83,9)	
Work sitting down				0,266[b]			<0,001[b]
Always/almost always	106 (71,1)	72 (67,9)	34 (32,1)		13 (12,3)	93 (87,7)	
Very often	30 (20,1)	15 (50)	15 (50)		12 (40)	18 (60)	
Sometimes	7 (4,7)	5 (71,4)	2 (28,6)		4 (57,1)	3 (42,9)	
Never/rarely	6 (4)	3 (50)	3 (50)		5 (83,3)	1 (16,7)	
Work standing up				0,945[a]			0,104[a]
Always/almost always	36 (24,2)	22 (61,1)	14 (38,9)		7 (19,4)	29 (80,6)	
Sometimes	17 (11,4)	11 (64,7)	6 (35,3)		7 (41,2)	10 (58,8)	
Not often	42 (28,2)	26 (61,9)	16 (38,1)		12 (28,6)	30 (71,4)	
Never/rarely	54 (36,2)	36 (66,7)	18 (33,3)		8 (14,8)	46 (85,2)	

Note:[a]Chi-square test; [b]Fisher's exact test; [c]Mann-Whitney U test

Table 2. Crude odds ratios and 95% confidence intervals (95%CI) of insufficient level of physical activity and the presence of sedentary behavior, sociodemographic variables, work aspects, clinical aspects and lifestyle habits in university professors in the Brazilian Midwest (N = 152)

	Insufficient level of physical activity OR (95%CI)	p	Sedentary behavior OR (95%CI)	p
Sex				
Female	1,00 (0,51 – 1,93)	1,00	0,81 (0,38 – 1,72)	0,584
Male	Ref.		Ref.	
Age				
≤ 50 years old	Ref.		Ref.	
> 50 years old	1,56 (0,46 – 5,22)	0,472	1,11 (0,29 – 4,21)	0,882
BMI classification				
Normal weight	Ref.		Ref.	
Overweight	1,87 (0,90 – 3,85)	0,089	**3,26 (1,29 – 8,23)**	0,012
Moderate/severe obesity	**5,75 (1,76 – 18,71)**	0,004	0,90 (0,34 – 2,38)	0,832
Marital status				
Without a partner	Ref.		Ref.	
With a partner	1,58 (0,80 – 3,08)	0,184	0,91 (0,41 – 1,99)	0,817
Dependents				
Without dependents			Ref.	
With dependents	**3,75 (1,86 – 7,54)**	<0,001	0,50 (0,21 – 1,17)	0,112
Teaching timein years	1,05 (0,99 – 1,10)	0,053	**1,06 (1,00 – 1,13)**	0,043
Area of activity				
Health	Ref.		Ref.	
Other areas	0,744 (0,39 – 1,50)	0,447	**3,30 (1,49 – 7,29)**	0,003
Work time				
One period (morning, afternoon or evening)	Ref.		Ref.	
Two periods (morning and afternoon; morning and evening; afternoon and evening)	1,02 (0,30 – 3,44)	0,977	3,36 (0,95 – 11,87)	0,060
Three periods (morning, afternoon and evening)	1,85 (0,48 – 6,96)	0,366	1,65 (0,44 – 6,17)	0,458
Telework				
No	Ref.		Ref.	
Yes (total or partial)	0,80 (0,33 – 1,93)	0,622	1,83 (0,54 – 6,14)	0,324
Weekly workload	1,05 (0,99 – 1,10)	0,053	0,66 (0,23 – 1,87)	0,436
Schedule difficulty				
Never/rarely	Ref.		Ref.	
Little	0,76 (0,34 – 1,68)	0,500	0,65 (0,27 – 1,57)	0,343
Often	1,61 (0,56 – 4,66)	0,372	1,05 (0,33 – 3,33)	0,922
Very often/always	0,68 (0,18 – 2,49)	0,566	1,32 (0,25 – 6,80)	0,737
Absence in the last 12 months				
No	Ref.		Ref.	
Yes	0,85 (0,30 – 2,38)	0,757	0,66 (0,21 – 2,03)	0,472
Employment relationship				
Tenure	Ref.		Ref.	
Hired	0,63 (0,27 – 1,45)	0,282	0,87 (0,33 – 2,27)	0,784
Acute or chronic disease				
No	Ref.		Ref.	
Yes	**2,67 (1,35 – 5,28)**	0,005	1,08 (0,49 – 2,35)	0,845
Tobacco consumption				
Non-smoker/ex-smoker	Ref.		Ref.	
Smoker	9,87 (0,00 – 0,00)	0,985	0,59 (0,05 – 6,72)	0,672
Alcoholic beverage consumption				
Does not consume	Ref.		Ref.	
Less than 15 cup per week	0,80 (0,36 – 1,76)	0,587	0,43 (0,18 – 1,01)	0,053
15 cups or more per week	0,64 (0,28 – 1,46)	0,295	1,66 (0,54 – 5,10)	0,370
Coffee consumption in cups – average	1,04 (0,91 – 1,20)	0,528	1,13 (0,95 – 1,34)	0,150
Housework				
Never	Ref.		Ref.	
Rarely/sometimes	0,89 (0,30 – 2,60)	0,832	1,21 (0,35 – 4,14)	0,761
Often/always	0,68 (0,21 – 2,15)	0,516	0,63 (0,17 – 2,27)	0,483
Average daily sleep time (hours)	0,89 (0,66 – 1,20)	0,443	**1,46 (1,04 – 2,05)**	0,028
Sleep quality				
Very good	Ref.		**Ref.**	
Good	3,76 (1,68 – 8,43)	0,001	**1,60 (0,66 – 3,86)**	0,295
Bad	5,77 (1,90 – 17,56)	0,002	**1,12 (0,37 – 3,36)**	0,836
Very bad	8,66 (1,67 – 44,94)	0,010	**4,55 (0,52 – 39,23)**	0,168
Neck pain				
No	Ref.		**Ref.**	
Yes	2,33 (1,06 – 5,09)	0,034	**2,42 (0,92 – 6,31)**	0,071
Upper back pain				
No	Ref.		**Ref.**	
Yes	2,43 (0,85 – 6,96)	0,098	**1,09 (0,37 – 3,19)**	0,874

Continue …

Lower back pain				
No	Ref.		Ref.	
Yes	**3,89 (1,75 – 8,59)**	<0,001	**2,59 (1,05 – 6,42)**	0,040
Shoulder pain				
No	1,95 (0,66 – 5,69)	0,221	Ref.	
Yes			3 (0,66 – 13,62)	0,155
Elbow pain				
No	Ref.		Ref.	
Yes	2,19 (0,43 – 10,91)	0,340	1,05 (0,20 – 5,30)	0,953
Pain in the wrists/hands				
No	Ref.		Ref.	
Yes	1,22 (0,39 – 3,78)	0,726	0,804 (0,23 – 2,70)	0,725
Hip/thigh pain				
No	Ref.		Ref.	
Yes	1,85 (0,36 – 9,51)	0,459	**0,15 (0,03 – 0,69)**	0,015
Knee pain				
No	Ref.		Ref.	
Yes	1,21 (0,29 – 5,05)	0,790	1,05 (0,20 – 5,30)	0,953
Ankles/feet pain				
No	Ref.		Ref.	
Yes	0,58 (0,14 – 2,43)	0,458	2,16 (0,25 – 18,21)	0,478
Negative influence of work on private life				
Nothing/almost nothing	Ref.		Ref.	
A little	1,96 (0,73 – 5,40)	0,178	1,10 (0,38 – 3,17)	0,863
Moderately	**4,76 (1,57 – 14,40)**	0,006	**4,55 (1,16 – 17,82)**	0,030
A lot/extremely	2,88 (0,92 – 9,03)	0,068	1,53 (0,44 – 5,26)	0,497
Negative influence of working time				
Nothing/almost nothing	Ref.		Ref.	
A little	1,17 (0,42 – 3,29)	0,754	2,15 (0,72 – 6,40)	0,168
Moderately	**5,34 (1,62 – 17,21)**	0,005	**5,07 (1,39 – 18,45)**	0,014
A lot/extremely	2,92 (0,93 – 9,26)	0,066	1,85 (0,57 – 6)	0,304
Family perception of overwork				
Nothing/almost nothing	Ref.		Ref.	
A little	1,02 (0,28 – 3,75)	0,965	**4,80 (1,21 – 18,97)**	0,025
Moderately	2,58 (0,73 – 9,11)	0,140	**6,40 (1,68 – 24,32)**	0,006
A lot/extremely	2,64 (0,78 – 8,91)	0,118	**8,32 (2,25 – 30,72)**	0,001
Work sitting down				
Always/almost always	2,11 (0,40 – 11,04)	0,373	**35,76 (3,86 – 330,69)**	0,002
Very often	1,00 (0,17 – 5,77)	1,00	7,50 (0,77 – 72,44)	0,082
Sometimes	2,50 (0,25 – 24,72)	0,433	3,75 (0,27 – 51,37)	0,322
Never/rarely	Ref.		Ref.	
Work standing up				
Always/almost always	Ref.		Ref.	
Sometimes	1,17 (0,35 -3,87)	0,801	0,34 (0,09 – 1,23)	0,100
Not often	1,03 (0,41 – 2,58)	0,943	0,60 (0,20 – 1,75)	0,352
Never/rarely	1,27 (0,52 – 3,06)	0,590	1,38 (0,45 – 4,24)	0,565

Note: OR = odds ratio; 95%CI = 95% confidence interval

Table 3. Adjusted odds ratios and 95% confidence intervals (95%CI) of insufficient level of physical activity and sociodemographic variables, work aspects, clinical aspects and lifestyle habits in university professors in the Brazilian Midwest (N = 152)

	Physical activity level OR (95%CI)	**p**
BMI classification		
Normal weight	Ref.	
Overweight	2,41 (0.95 – 6.05)	0,061
Moderate/severe obesity	**5.09 (1.28 – 20.21)**	0.002
Dependents		
Without dependents	Ref.	
With dependents	**3.32 (1.24 – 8.45)**	0.016
Acute or chronic disease		
No	Ref.	
Yes	1.02 (0.37 – 2.78)	0.969
Sleep quality		
Very good	Ref.	
Good	1.78 (0.64 – 4.92)	0.262
Bad	2.30 (0.54 – 9.66)	0.255
Very bad	3.03 (0.39 – 23.43)	0.288
Neck pain		
No	Ref.	
Yes	0.57 (0.19 – 1.75)	0.334
Lower back pain		
No	Ref.	
Yes	**4.14 (1.44 – 11.88)**	0.008
Negative influence of work on private life		
Nothing/almost nothing	Ref.	
A little	A little	A little
Moderately	0.19 (0.01 – 2.90)	0.238
A lot/extremely	0.07 (0.00 – 1.26)	0.072
Negative influence of working time		
Nothing/almost nothing	Ref.	
A little	1.23 (0.24 – 6.25)	0.801
Moderately	**21.97 (1.35 – 356.30)**	0.030
A lot/extremely	**19.63 (1.11 – 346.78)**	0.042

Note: OR = odds ratio; 95%CI = 95% confidence interval

Table 4. Adjusted odds ratios and 95% confidence intervals (95%CI) of the presence of sedentary behavior and sociodemographic variables, work aspects, clinical aspects and lifestyle habits in university professors in the Brazilian Midwest (N = 152)

	Sedentary behavior OR (95%)	P
BMI classification		
Normal weight	Ref.	
Overweight	1,75 (0,48 – 6,37)	0,391
Moderate/severe obesity	0,48 (0,09 – 2,46)	0,379
Teaching timein years	0,99 (0,91 – 1,09)	0,911
Area of activity		
Health	Ref.	
Other areas	2,90 (0,75 – 11,15)	0,120
Average daily sleep time in hours	1,03 (0,59 – 1,79)	0.911
Lower back pain		
No	Ref.	
Yes	3,03 (0,75 – 12,16)	0,116
Hip/thigh pain		
No	Ref.	
Yes	0,10 (0,00 – 1,13)	0,062
Negative influence of work on private life		
Nothing/almost nothing	Ref.	
A little	0.28 (0.03 – 2.63)	0,269
Moderately	1,69 (0,08 – 35,14)	0,734
A lot/extremely	0,47 (0,01 – 11,98)	0,654
Negative influence of working time		
Nothing/almost nothing	Ref.	
A little	1,70 (0,18 – 15,66)	0,635
Moderately	0,43 (0,02 – 8,84)	0,585
A lot/extremely	0,27 (0,00 – 8,88)	0,468
Family perception of overwork		
Nothing/almost nothing	Ref.	
A little	**15,33 (1,90 – 123,47)**	0,010
Moderately	**12,82 (1,61 – 101,87)**	0,016
A lot/extremely	**44,45 (4,47 – 441,93)**	0,001
Work sitting down		
Always/almost always	17,39 (0,87 – 346,10)	0,061
Sometimes	2,71 (0,14 – 52,22)	0,509
Not often	2,67 (0,07 – 91,90)	0,586
Never/rarely	Ref.	

The analyses of the adjusted odds ratios for the presence of sedentary behavior are presented in Table 4 according to the significance presented in the crude analyses. The results show that only the different perceptions of the professor's overwork by the family were associated with greater chances of the presence of sedentary behavior.

DISCUSSION

The present study examined the levels of physical activity and sedentary behavior and evaluated the factors that were associated with these behaviors, in a population of university professors in the Brazilian Midwest. The prevalence of insufficient level of physical activity was 62.5% and the presence of sedentary behavior was observed in 77% of university professors evaluated. A study that evaluated the general population of 46 low and middle income countries identified a prevalence of 30% of the population with an insufficient level of physical activity (Koyanagi et al., 2018). According to the Brazilian Institute of Geography and Statistics (IBGE), in Brazil 2021, during the pandemic period of social isolation, 36.7% of adults did not reach the minimum recommendation for physical activity according to WHO. The results of the present study demonstrate a considerably higher number (62.5% > 37.5%) of the evaluated professors who do not practice enough physical activity, which highlights the risk for the development of injuries related to physical inactivity among this population group. The proportion of professors in this study who practiced enough physical activity was slightly higher than that found among the general Brazilian population (36% in the stratified group with the highest proportion of physically active people) (Faleiro et al., 2017). The few studies that evaluated the practice of physical activity among professors, in the Brazilian context, report the amount of 55.4% of inactive professors and 16.4% of professors with an insufficient level of physical activity practice (Santos et al., 2018), a similar result to that found in the present study.

Regarding sedentary behavior, the results found in this study demonstrate a much higher percentage (77%) of the presence of this behavior when comparing what was observed with a study carried out in a pre-pandemic period with professors at a university in Minas Gerais (30.7%) (Santana & Peixoto, 2017). The high number of professors classified with the presence of sedentary behavior during the week can be justified, only in part, by the characterization of the professional teaching practice that requires the designation of an extensive period of time in the preparation of classes and academic materials, in addition to the correction of activities of a large number of students, which are all carried out sitting down. Therefore, the activities carried out in teaching are highly characterized by extensive periods of inactivity and sedentary behavior exacerbated by the working conditions resulting from the pandemic crisis. Thus, the high rates related to insufficient practice of physical activity and the presence of sedentary behavior may be associated with the COVID-19 pandemic situation. Studies have shown, despite varying measurement methods, a significant self-reported decrease in physical activity, along with an increase in sedentary behavior, when comparing periods before sanitary lockdowns with periods during COVID-19 lockdowns, as presented in a systematic literature review (Stockwell et al., 2021). One study objectively assessed the level of physical activity, using a movement tracking app, in the periods before, during and immediately after the COVID-19 lockdown in the UK and the results suggest a significant drop in physical activity during sanitary lockdown (McCarthy et al., 2021). Data on the frequency of insufficient practice of physical activity and the presence of sedentary behavior will directly interfere with the quality of life and increase the risk of developing chronic non-communicable diseases, in addition to the consequences for the work aspects of professors, resulting in high economic expenditure stemming from these problems (Ding et al., 2016). In this sense, the understanding of the factors that may be associated with these behaviors must be substantiated in order to contribute to the planning and adoption of

preventive actions that can be adopted by the institutions in which professors are inserted. Among the factors associated with an insufficient level of physical activity, after adjusting for possible confounding variables, moderate/severe obesity, the presence of a dependent in the family, lower back pain and the negative influence of time dedicated to teaching continued to be significant predictors.

When approaching physical activity and weight gain, one can ponder, that overweight adults may have barriers to the practice of physical activity, such as the discomfort perceived during the activity and the feeling of inferiority and inadequacy for the practice and that, consequently, can influence the desire to be physically active (Bombak, 2015).Another important highlight is that in recent years there has been an upward increase in the association curve between insufficient physical activity and obesity (World Health Organization WHO, 2020), that is, a reduced level of physical activity creates favorable conditions for weight gain, and therefore contributes to the risk of obesity (Gray et al., 2018). Similar to the findings of the association found in the present study, between obesity and insufficient level of physical activity (OR = 5.09; 95%CI 1.28 – 20.21), this association was also observed in a survey carried out in Spain which evaluated the adult population between the ages of 18-30 (Laredo-Aguilera et al., 2019). University professors evaluated with dependents in the family environment were 3.2 times more likely to insufficiently adopt physical activity practices.

This data can be explained by the need to offer care to family dependents, which results in less time available for physical activity (Vedovato& Monteiro, 2014). Perceptions of the negative influence of working time on professors' lives were associated with insufficient practice of physical activity and can possibly be explained by the extensive workload imposed by teaching activities, as pointed out by other studies that report the influence of occupational factors in the state of professors' health. This way, it may have a cumulative effect with implications for the availability to practice physical activity, that is, working time demands are added to family obligations and teaching. Both requirements put together create an unfavorable scenario (Kwiecień-Jaguś et al., 2021; Moreno-Abril et al., 2007). It is worth mentioning that in the crude logistic regression, professors who work in areas of knowledge other than health were 3.30 (95%CI 1.49 – 7.29) times more likely to have a sedentary behavior when compared to professors in the health area. These findings may be related to the fact that a significant part of health professors work beyond the classroom, often in health units, especially during the COVID-19 pandemic period. Work practice in health units requires physical dynamism, which may result in a lower probability of remaining seated, therefore, professional practice in the health area results in a protective factor for not adopting sedentary behavior (Thivel et al., 2018).

A study that evaluated Brazilian public school teachers at elementary and high school levels found an association between insufficient physical activity and the perception of poor or regular balance between personal and professional life, which may be associated with the need to work overtime, making it difficult to adopt behaviors related to the practice of physical activity (Dias et al., 2017). Lower back pain was a strong predictor of insufficient physical activity in this study, and evidence demonstrates that low levels of physical activity are determinant for the development of pain, which results in one of the main causes of disability worldwide (Yiengprugsawan et al., 2017). In this sense, the prevention of lower back pain is recognized as an important challenge in high-risk populations, such as professors, due to the characterization of work practice and difficulties in adapting to physical working conditions, in addition to the need to address the high health costs related to rehabilitation and therapy (Knezevic et al., 2021). The presence of sedentary behavior during the week among the evaluated university professors, after adjusting the model, was significantly associated only with the family's high perception of overwork. This result can be explained by the fact that family members observe manifestations of changes in mood and, for this reason, advise the need for rest to compensate for excessive work practice(O'Donoghue et al., 2016).

The study observes that work has been occupying more and more space in the lives of professors, limiting the time devoted to family life and favoring the adoption of physical attitudes with little expenditure of energy, resulting in sedentary behavior, which is mistakenly seen as an opportunity for rest (Feijão e Moraes, 2018). Similar to what was found in this research, a study carried out with public school teachers in a city in the state of São Paulo did not find associations between sedentary behavior and lifestyle and eating habits (Delfino, Tebar, Gil, et al., 2020). In another study, researchers, when evaluating 245 teachers, identified a prevalence of 55.3% of sedentary behavior associated only with obesity (Delfino, Tebar, Tebar, et al., 2020). The results of this study reflect the importance of carrying out studies that analyze the predictors associated with sedentary behavior to identify modifiable factors with a view to developing a physically active lifestyle. The results of this research show the need to create intervention programs in which the university environment is favored due to the availability of qualified human resources - such as health professionals - in addition to the presence and access to physical facilities that can favor the increase in levels of physical activity (Gilson et al., 2009). The results presented by this study must be analyzed under some limitations. The results cannot be generalized because it is an evaluation carried out in a specific group of university professors. Self-report variables may be influenced by recall bias, which is a factor that should be considered, in addition to the study design being cross-sectional, which does not allow for cause and effect analysis. However, despite the mentioned limitations, the findings of the present study contribute to the scientific framework of the health conditions and lifestyle of a group of workers, using validated assessment material and a series of factors that can cause an impact on the health of university professors.

CONCLUSION

The results of the present study show the high prevalence of insufficient practice of physical activity and the high presence of sedentary behavior among university professors. In general, it is suggested that the insufficient practice of physical activity is associated with obesity, the existence of family dependents, lower back pain and the negative influence of working time. The presence of sedentary behavior was associated with the negative influence of the family's perception of overwork. New research should be carried out in order to understand the impact that considerable changes in teaching practice due to a digital trend may result in habits and lifestyles related to the practice of physical activity and sedentary behavior. The pandemic crisis resulted in the opening of possibilities for a new digital age in university education and this may contribute to the increase in the number of sedentary professors who have lower levels of physical activity. Understanding the factors associated with the practice of physical activity and sedentary behavior can contribute to reducing the effect of future high prevalence of inactivity and favoring the prevention of chronic non-communicable diseases.

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