Characteristics Associated With People With Chronic Low Back Pain Meeting Physical Activity Guidelines and Recommendations for Sedentary Behavior: A Cross-Sectional Study

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Abstract

Objective: The purpose of this study was to identify factors associated with meeting physical activity guidelines and sedentary recommendations in people with chronic low back pain (LBP).

Methods: This was a cross-sectional study including 171 people with chronic LBP. Trained assessors collected information regarding demographic, anthropometric, and clinical data. Physical activity levels and sedentary time were objectively measured using a tri-axial accelerometer. Participants were classified as being physically active (ie, performing at least 150 minutes of moderate or 75 minutes of vigorous physical activity per week) and sedentary (ie, more than 8 hours of time spent in sedentary activities per day). Multivariable logistic regression analyses were used to determine the association of being physically active or sedentary with the range of demographic, anthropometric and clinical variables.

Results: Our results showed that although lower body mass index (odds ratio [OR] = 0.91; 95% CI: 0.85-0.98) and higher self-reported levels of leisure time physical activity (OR = 3.46; 95% CI: 1.94-6.15) were associated with being physically active, lower self-reported levels of physical activity at work (OR = 0.56; 95% CI: 0.39-0.81) was associated with being sedentary.

Conclusion: Our findings showed that, in people with LBP, lower body mass index and higher levels of leisure time physical activity may be important factors for identifying those physically active. In contrast, lower levels of physical activity at work may be considered when identifying sedentary people with LBP. Future studies should consider these factors when designing interventions aiming to promote physical activity and decrease sedentary behavior in this population. (J Manipulative Physiol Ther 2021;44;378-388)

Key Indexing Terms: *Low Back Pain; Motor Activity; Sedentary Behavior, Accelerometry*

Introduction

Low back pain (LBP) is one of the most prevalent musculoskeletal conditions and one of the major contributors to years lived with disability worldwide.[1] Furthermore, LBP is the leading cause of activity limitation and work absence,[2] imposing an enormous economic burden on individuals, society, and governments.[3] Although most people with acute LBP generally have a favorable prognosis in the first 6 weeks,[4] approximately one-half of these people may experience a new episode of LBP within 1 year.[5-7] In addition, 5% to 15% of these people will develop chronic LBP (ie, pain lasting more than 3 months),[8-10] accounting for a substantial proportion of the costs related to LBP.[11]

Physical activity has been considered an essential component for the management of chronic LBP. Although clinical practice guidelines for treating people with chronic LBP consistently recommend to people to stay active and return to normal activities soon as possible,[12-14] there is evidence to suggest that most interventions in this area are not able to effectively increase physical activity levels.[15] A possible explanation is that the available interventions are designed to make people more active only during the intervention period, for instance exercise classes and walking

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Paper submitted July 30, 2019; in revised form July 31, 2020; accepted March 30, 2021.

0161-4754

https://doi.org/10.1016/j.jmpt.2021.03.005

program, but are not designed to change people's behavior and getting them to adopt a more active lifestyle after the course of treatment.[15]

In the field of chronic LBP, it is well recognized that some people's characteristics may influence their behavior toward a more active or sedentary lifestyle, such as age,[16] sex,[16-18] pain,[19] disability,[17] body mass index (BMI),[20] and physical activity domains.[16,21] However, most previous studies use self-reported measures only to define the people's physical activity levels or sedentary status, which may capture people's perception on the amount or type of physical activity performed.[22] Assessment of physical activity behavior can be complemented with information derived from objective measures, such as accelerometers. The accelerometers, for instance, use technology to measure and record in real time the biomechanical consequences of performing physical activity.[23]

Given that physical activity is fundamental to treat people with LBP,[24] identifying factors associated with a more active or sedentary lifestyle, using self-reported and objective measures of physical activity, may provide useful information to guide the development of future intervention strategies, aiming to promote a healthy lifestyle in people with chronic LBP. Therefore, the aim of this study was to identify factors associated with meeting physical activity guidelines and sedentary behavior recommendations in people with chronic LBP.

Methods

This cross-sectional design study was conducted in Brazil and the ethics research committee of the São Paulo State University approved this study (CAAE36332514.0.0000.5402). Participants who agreed to participate in the study voluntarily signed an informed consent form.

Participants

People with chronic nonspecific LBP were recruited through advertisements in the community, on social media, and at 2 outpatient physical therapy university clinics in Presidente Prudente, Brazil. Chronic nonspecific LBP was defined as pain lasting more than 12 weeks, with or without referred leg pain, localized below the costal margin and above the lower gluteal folds.[25] Participants were included if they were aged between 18 and 60 years and reported moderate-intensity LBP or moderate interference with function as measured by items 7 and 8 of the 36-Item Short Form Health Survey.[26] Participants with presence or suspicion of specific conditions (eg, infection, tumors, osteoporosis, fracture, structural deformity, inflammatory disorder, ankylosing spondylitis) as assessed by a checklist and radiculopathy (presence of at least 2 of the following signs: weakness, reflex alteration, and sensorial loss, associated with spinal nerve) were excluded. We also excluded people who had previous spinal surgery in the past 6 months, multiple complaints or chronic pain in other areas of the body (neck, head, thoracic spine, or arms), and contraindication to the practice of physical exercise based on Guidelines of the American College of Sports Medicine.[27]

Sample Size

The sample size for the present study was 171 participants in accordance with the recommended criterion for regression studies, which suggests the inclusion of 10 to 15 participants for each independent variable included in the final model.[28-31] For this study, we investigated 11 independent variables (symptom duration, employment, education level, pain, disability, depression, fear of movement, BMI and physical activity domains at work, sport and nonsport leisure time), which would require a sample between 110 and 165 participants. The actual sample size for this study was 171, which fell in the range suggested by the sample calculation.

Procedures

We conducted a cross-sectional study, and all participants were informed about the purpose of the study and voluntarily signed the consent form. Trained assessors administered self-report questionnaires collecting demographic, anthropometric and clinical data (ie, pain intensity, disability, fear of movement, physical activity domains, and depression). Objective measures of physical activity levels and time spent in sedentary activities were collected using the ActiGraph GT3X accelerometer (Pensacola, FL, USA) during waking hours for 7 consecutive days.

Instruments

The following information were collected at assessment:

- Sociodemographic and anthropometric data: sex, age, BMI, education level (ie, no education beyond primary school, no education beyond secondary school, tertiary education incomplete, and tertiary education complete), employment status (ie, unemployed, employed part-time, and employed full-time), and symptom duration.
- Disability was assessed using the Roland Morris Disability Questionnaire (RMDQ). This questionnaire consists of 24 yes-or-no items measuring functional limitations during daily activities. The total score ranges from 0 (no disability) to 24 (maximum disability).[32,33]
- Pain: The average pain intensity over the last 24 hours was measured with an 11-point numerical rating scale, where 0 indicates "no pain" and 10 "the worst pain possible."[34]
- Fear of movement: The Tampa Scale of Kinesiophobia (TSK) is a self-report measure of fear of movement

and (re)injury. The TSK consists of 17 items, and the response is a 4-point Likert scale: strongly disagree, somewhat disagree, somewhat agree, and strongly agree (ie, equivalent scores from 1 to 4). The total score ranges from 17 to 68, which higher scores indicate higher fear of movement.[35,36] The Brazilian version of the TSK has shown to have acceptable reliability.[37]

- Depression: The Beck Depression Inventory contains 21 items scored from 0 to 3 to measure depression symptoms, with scores ranging from 0 (not depressed at all) to 63 (severely depressed).[38,39] The questionnaire has good psychometric properties and is validated to measure the severity of depression in people with chronic pain.[40,41]
- Self-reported physical activity: The Baecke Habitual Physical Activity Questionnaire is a self-reported measure of habitual physical activity and has 16 items. The total score ranges from 3 to 15, with higher scores indicating higher physical activity level.[42,43] The following indices of habitual physical activity were derived from the domains: work; sports, and non-sport leisure time, which includes transportation.[44] This questionnaire has proven to have highly test-retest reliability in general population[42] and to be reproducible in people with chronic LBP.[45]
- Objectively measured physical activity and sedentary time were collected by a triaxial accelerometer. This accelerometer is a noninvasive, small, lightweight device (4.6 × 3.3 × 1.5 cm, 19 g) that is worn by the participants during waking hours for 7 consecutive days on the right hip. Acceleration data were sampled at 30 Hz and analyzed at 60 seconds epochs.[46] *Complete data* was defined as having at least 10 hours per day of monitored wear during at least 5 days.[23,46]

We defined nonwear periods as time intervals of at least 60 consecutive minutes of 0 counts, with an activity interruption allowance of 0 to 100 counts/min lasting a maximum of 2 consecutive minutes.[47] The time spent in sedentary activities was estimated as the amount of wear time accumulated below 100 counts/min.[47] The physical activity measures derived from the accelerometer was time spent on moderate-to-vigorous physical activity in minutes per week and (2) time spent on sedentary activities. The time spent on moderate-to-vigorous physical activity were calculated using the cutoff (ie, values greater than 2020 counts/min) described by Troiano et al (2008).[46] The time spent in sedentary behavior was estimated as the amount of wear time accumulated below 100 counts/min (less than 1.5 METs),[47] which is any waking behavior, such as sitting, reclining, or lying posture, not considering sleep hours.[48,49] The accelerometer variables were obtained from the vertical axis. Data collected with the accelerometer were analyzed using the ActiLife 6 software.

Data Analysis

Continuous variables were reported using mean and SD and categorical and dichotomous measures using frequency and percentage. We performed a multivariable logistic regression analysis using time spent on moderate-to-vigorous physical activity and time spent on sedentary activities as the dependent variables in the analyses. Both variables were dichotomized according to the following. The World Health Organization of at least 150 minutes of moderate-to-vigorous physical activity per week for adult population[50] was used to classify people in sufficiently physically active (ie, equal or more than 150 minutes of moderate-to-vigorous physical activity per week) and not sufficiently physically active (ie, less than 150 minutes of moderate- and vigorous-intensity physical activity/week). For the sedentary behavior, participants were classified as sedentary (ie, 8 hours or more spent on sedentary activities per day on average) and not sedentary (ie, less than eight hours spent on sedentary activities per day on average).[49]

We selected the independent variables considering previous studies investigating determinants of lifestyle factors in people with LBP and other populations.[51-53] The following variables were included in the model as potential independent variables to investigate the association with the dependent variables: employment status, educational level, duration of symptoms, BMI, pain intensity, disability, fear of movement, depression, and physical activity domains (ie, work, sports, and non-sport leisure time). In addition, age and sex were considered possible covariates. The variables sex, education level, and employment status were included in the model as dichotomized or categorical variables, and the remaining variables were included as continuous variables.

For the first step in the analyses, we performed univariate logistic regressions between independent and dependent variables. The variables showing an association of $P < .20$ in the univariate models were eligible for the second step in the analyses, that is, the multivariable logistic regression analyses. We adopted a greater P value as a criterion to be included in the multivariable analysis to ensure that any potential independent variables could have a chance to remain in the final model and reduce the chances of mistaken removals. All variables with a $P<.20$ were included in the base model of the multivariable logistic regression analysis using a stepwise backward elimination approach to obtain the final model. A P value of.05 was set as criterion for the variables to remain in the final model in the multivariate logistic regression. In addition, we also provided an estimate of the final model adjusted by age and sex. We investigated the presence of multicollinearity between the independent variables using Pearson or Spearman correlation. However, none of the independent variables showed a correlation greater than 0.6 (Appendix 1). All analyses were performed using the SPSS version 23.0.

Results

From October 2014 to May 2017, 218 participants with chronic LBP were assessed. Of these, 47 (21.5%) participants did not complete the questionnaire or did not wear the accelerometer correctly for the required amount of time and were excluded from the analysis. Hence, the analysis reported in the current study include data from 171 people with chronic LBP.

The sample had predominantly women (67.3%) with mean age (SD) of 40.3 (11.6) years and mean body mass index of 28.0 (5.5) kg/m^2. Moreover, participants reported an average pain intensity of 6.4 (1.8), mean disability of 12.1 (5.0), and median (interquartile range) duration of symptoms of 12 months (6.0-48.0). From the total sample, 61 (35.7%) people met the physical activity recommendations and, therefore, they were classified as sufficiently physically active, whereas 124 (72.5%) were classified as sedentary. Table 1 provides the characteristics of the whole sample and for the subgroups of people considered sufficiently or not sufficiently physically active and sedentary and/not sedentary.

Table 2 provides the results of the univariate logistic analyses. The univariate analyses revealed that women, BMI, depression, disability, educational level (ie, no education beyond secondary school and tertiary education incomplete), employment (ie, employed full-time), and the physical active domain work, sports, and non-sport leisure time had association with being sufficiently physically active. In addition, depression, work physical activity, and educational level (ie, primary school incomplete) showed association with being sedentary. The remaining variables were not further investigated in the multivariable analysis, because they were not associated with the dependent variables (ie, $P > .20$).

The results of the multivariable logistic regression analyses are described in Tables 3 and 4. Our findings showed a significant association of being sufficiently physically active with lower BMI (OR = 0.92; 95% CI: 0.85-0.98) and higher self-reported physical activity in non-sport leisure time (OR = 3.46; 95% CI: 1.94-6.15). The adjusted model showed similar results of the association between BMI (OR = 0.92; 95% CI: 0.86-0.99) and self-reported levels of non-sport leisure time physical activity (OR = 3.45; 95% CI: 1.91-6.21) with being sufficiently physically active.

For the sedentary behavior analyses, we found a significant association of being sedentary with lower self-reported levels of physical activity at work (OR = 0.56; 95% CI: 0.39-0.81), which showed similar results in the adjusted model (OR = 0.57; 95% CI: 0.39-0.82). Thus, individuals not sufficiently physically active at work domain were more likely to spent more than 8 hours per day in sedentary activities. The results did not change even after adjusting the final regression model for the covariates (ie, age and sex for sufficiently physically active and age, sex and BMI for sedentary). In addition, the R^2 values for both analyses were 21% and 9%, respectively.

Discussion

Our findings revealed that lower BMI and higher self-reported physical activity in nonsport leisure time were associated with being sufficiently physically active, whereas lower self-reported physical activity level at work is associated with being sedentary. Noteworthy, pain, disability, and psychosocial factors (ie, fear of movement and depression) were found to not influence physical activity and sedentary behaviors in people with chronic LBP.

Our findings revealed a higher proportion (64%) of participants classified as not sufficiently physically active (ie, did not achieved the recommendations of performing at least 150 minutes of moderate physical activity, 75 minutes of vigorous physical activity, or a combination of moderate and vigorous physical activity) compared to the proportion (31%) reported in general population.[54] Our results, however, are in line with previous studies, which shows that the proportion of people with chronic musculoskeletal conditions considered to be not sufficiently physically active among ranges from 41% to 61%.[55,56] Our findings contradict a previous systematic review showing that people with LBP may not be less active than healthy people.[57] Nevertheless, this review identified limited evidence, and additional studies are required to better understand the physical activity level pattern of this population.[57]

Our results give some support to the potential role of BMI in the physical activity levels of people with chronic LBP. We found that higher BMI was associated with reduced chances of people with chronic LBP being sufficiently physically active. This finding aligns with previous studies in the general population.[21,58,59] Given that it is well known that being overweight or obese is associated with higher level of disability in people seeking care for LBP,[60] we would argue that further studies should investigate factors associated with maintenance of normal BMI. For instance, there is evidence that individuals who walk at least 2 hours per week[61] and perform active transport[62] are more likely to lose weight. Our study also showed that higher self-reported levels of non-sport leisure time physical activity was associated with being sufficiently physically active. These results are in accordance with the findings of previous studies highlighting the importance of leisure time in the prevention[16] and favourable prognostic factor[63] in patients with chronic LBP. Therefore, interventions designed to promote physical activity in non-sport leisure time and encourage incidental physical activities, such as active transport, should be tested in future trials aiming at changing people's behavior toward an active lifestyle.[64]

We also found that lower self-reported physical activity at work was associated with being sedentary in people with

Table I. *Sample Characteristics Who Met the PA Guidelines and Time Spend in Sedentary Activity*

Variables	Total Sample (n = 171)	Sufficiently Physically Active (n = 61)	Not Sufficiently Physically Active (n = 110)	Not Sedentary (n = 47)	Sedentary (n = 124)
Sex (n)[a]					
Male (%)	56 (32.7)	16 (26.2)	40 (36.4)	17 (36.2)	39 (31.5)
Female (%)	115 (67.3)	45 (73.8)	70 (63.6)	30 (63.8)	85 (68.5)
Age (y)[b]	40.3 (11.6)	40.1 (11.9)	40.4 (11.5)	41.5 (9.8)	39.8 (12.3)
BMI (kg/m^2)[b]	28.0 (5.5)	26.5 (4.6)	28.8 (5.7)	28.1 (4.7)	28.0 (5.7)
Symptom duration (mo)[b]	12 (6.0-48.0)	12 (6.0-60)	13.5 (6.0-42.0)	12 (6.0-48.0)	15 (6.0-48.0)
Employment (n)[a] (%)					
Unemployed	69 (40.4)	28 (45.9)	41 (37.3)	16 (34.0)	53 (42.8)
Employed part-time	28 (16.4)	10 (16.4)	18 (16.4)	07 (14.9)	21 (16.9)
Employed full-time	74 (43.3)	23 (37.7)	51 (46.4)	24 (51.1)	50 (40.3)
Education level (n)[a] (%)					
No education beyond primary school[c]	14 (8.2)	5 (8.2)	9 (8.3)	7 (15.2)	7 (5.6)
No education beyond secondary school[d]	29 (17.0)	13 (21.3)	16 (14.7)	10 (21.7)	19 (15.4)
Tertiary education incomplete[e]	84 (49.1)	32 (52.5)	52 (47.7)	20 (43.5)	64 (51.6)
Tertiary education complete[e]	43 (25.1)	11 (18.0)	32 (29.4)	9 (19.6)	34 (27.4)
Pain intensity (NRS, 0-10)[b]	6.4 (1.8)	6.2 (1.7)	6.4 (1.8)	6.6 (1.8)	6.3 (1.7)
Disability (RMDQ, 0-24)[b]	12.1 (5.0)	11.2 (5.4)	12.6 (4.8)	11.7 (4.6)	12.3 (5.2)
Depression (BDI, 0-63)[b]	11.2 (7.6)	10.1 (6.9)	11.8 (7.9)	9.4 (6.5)	11.9 (7.9)
Fear of movement (TSK, 17-68)[b]	44.8 (7.0)	44.0 (5.7)	45.3 (7.6)	43.8 (6.8)	45.2 (7.1)
Work PA[b]	2.6 (2.0-3.3)	3.0 (2.1-3.6)	2.5 (1.7-3.2)	3.2 (2.6-3.6)	2.4 (1.7-3.2)
Sports PA[b]	1.7 (1.5-2.5)	2.0 (1.7-2.6)	1.7 (1.2-2.2)	1.7 (1.2-2.7)	1.7 (1.5-2.5)
Non-sport leisure time PA[b]	2.0 (1.7-2.5)	2.2 (2.0-3.0)	2.0 (1.5-2.5)	2.0 (1.5-2.7)	2.0 (1.7-2.5)

Data are mean SD, median IQR, or frequency (%).
BDI, Beck Depression Inventory; *BMI*, body mass index; *IQR*, interquartile range; *NRS*, Numerical Rating Scale; *PA*, physical activity; *RMDQ*, Roland Morris Disability Questionnaire; *TSK*, Tampa Scale of Kinesiophobia.
[a] Categorical variable.
[b] Continuous variable.
[c] In Brazil, primary schools provide education from the age of 5 to 11.
[d] In Brazil, secondary schools provide education from the age of 12 to 17.
[e] In Brazil, tertiary education provide education from the age of 18.

chronic LBP. Similarly, to being sufficiently physically active, the association considering the remaining domains showed no association with being sedentary, which implies that proposed strategies at work should be investigated to reduce time spent in this unhealthy behavior. Our result is in line with a recent cross-sectional study showing that lower self-reported physical activity at work is associated with higher sitting time.[65] Furthermore, another study found that work-related physical activity is the physical activity domain that most contributes to the overall physical activity levels of Brazilian population.[66] Interventions at the workplace should be investigated to reduce sedentary behavior of people with chronic LBP. Although it could be argued that these

Table 2. *Univariable Logistic Regression Analyses*

Variables	Sufficiently Physically Active		Sedentary	
	OR (95% CI)	*P*	OR (95% CI)	*P*
Sex[a]				
Male	1.00		1.00	
Female	1.60 (0.80-3.20)	.18	1.23 (0.61-2.50)	.55
Age[b]	0.85 (0.97-1.02)	.85	0.98 (0.95-1.01)	.40
BMI[b]	0.92 (0.86-0.98)	.01	0.99 (0.93-1.06)	.95
Symptoms duration[b]	1.00 (0.99-1.01)	.22	1.00 (0.99-1.01)	.29
Employment[a]				
Unemployed	1.00		1.00	
Employed part-time	0.81 (0.32-2.02)	.65	0.90 (0.32-2.51)	.84
Employed full-time	0.63 (0.31-1.26)	.19	0.61 (0.29-1.29)	.20
Education level[a]				
Tertiary education complete[e]	1.00		1.00	
No education beyond primary school[c]	1.61 (0.44-5.87)	.46	0.26 (0.07-0.95)	.04
No education beyond secondary school[d]	2.36 (0.86-6.44)	.09	0.50 (0.17-1.45)	.20
Tertiary education incomplete[e]	1.79 (0.79-4.04)	.16	0.84 (0.34-2.00)	.71
Pain intensity (NRS)[b]	0.93 (0.78-1.11)	.46	0.91 (0.75-1.10)	.36
Disability (RMDQ)[b]	0.94 (0.88-1.00)	.07	1.02 (0.95-1.09)	.52
Depression (BDI)[b]	0.97 (0.93-1.01)	.18	1.04 (1.00-1.10)	.05
Fear of movement (TSK)[b]	0.97 (0.93-1.01)	.22	1.02 (0.98-1.08)	.25
PA domains (BPQA)[b]				
Work PA[b]	1.44 (1.06-1.97)	.02	0.56 (0.39-0.80)	<.01
Sport PA[b]	1.79 (1.20-2.67)	<.01	0.81 (0.54-1.21)	.30
Non-sport leisure time PA[b]	3.40 (1.95-5.92)	<.01	0.91 (0.55-1.51)	.73

P value < 0.20.
BDI, Beck Depression Inventory; *BMI*, body mass index; *NRS*, Numerical Rating Scale; *OR*, odds ratio; *PA*, physical activity; *RMDQ*, Roland Morris Disability Questionnaire; *TSK*, Tampa Scale of Kinesiophobia.
[a] Categorical variable.
[b] Continuous variable.
[c] In Brazil, primary schools provide education from the age of 5 to 11.
[d] In Brazil, secondary schools provide education from the age of 12 to 17.
[e] In Brazil, tertiary education provide education from the age of 18.

associations between objective and self-reported measures reported (ie, self-reported non-sport leisure time with being sufficient physically activity and self-reported physical activity at work with being sedentary) may validate at some extent the Baecke Habitual Physical Activity Questionnaire domains in measuring physical activity, the remaining domains showed no association with neither being sufficiently physically active nor being sedentary. We would expect a similar association in other domains to support their validity. In addition, a

Table 3. *Multivariable Logistic Regression Analyses Considering Sufficiently Physically Active as Dependent Variable*

Model Steps	Variables	R^2	OR (95% CI)	*P*
Dependent variable: sufficiently physically active				
Base model[a]	(Constant)	32%		
	Sex		1.71 (0.70-4.17)	.23
	Tertiary education complete ₣		Reference	
	No education beyond primary schoold[d]		1.15 (0.24-5.46)	.85
	No education beyond secondary school[e]		2.71 (0.83-8.85)	.09
	Tertiary education incomplete[f]		1.51 (0.60-3.77)	.37
	Unemployed		Reference	
	Employed part-time		0.69 (0.22-2.11)	.51
	Employed full-time		0.58 (0.24-1.39)	.22
	BMI		0.92 (0.85-0.99)	.03
	Disability (RMDQ)		0.94 (0.87-1.02)	.17
	Depression (BDI)		0.96 (0.91-1.01)	.12
	Work PA (BPAQ)		1.36 (0.91-2.02)	.12
	Sport PA (BPAQ)		1.54 (0.90-2.65)	.11
	Non-sport leisure time PA (BPAQ)		2.98 (1.52-5.81)	<.01
Final model[b]	(Constant)	21%		
	BMI		0.91 (0.85-0.98)	.01
	Non-sport leisure time PA (BPAQ)		3.46 (1.94-6.15)	<.01
Final model adjusted[c]	(Constant)	21%		
	BMI		0.92 (0.86-0.99)	.01
	Non-sport leisure time PA (BPAQ)		3.45 (1.91-6.21)	<.01
	Age		0.99 (0.96-1.02)	.70
	Sex		1.39 (0.65-2.95)	.39

BDI, Beck Depression Inventory; *BMI*, body mass index; *BPAQ*, Baecke Habitual Physical Activity Questionnaire; *OR*, odds ratio; *PA*, physical activity; *RMDQ*, Roland Morris Disability Questionnaire.

[a] Base model: variable associated ($P < .20$).
[b] Final model: Statistically significant results ($P < .05$) .
[c] Final model adjusted: by age and sex.
[d] In Brazil, primary schools provide education from age 5 to 11.
[e] In Brazil, secondary schools provide education from age 12 to 17.
[f] In Brazil, tertiary education provide education from age 18.

Table 4. *Multivariable Logistic Regression Analyses Considering Sedentary as Dependent Variable*

Model Steps	Variables	R^2	OR (95% CI)	*P*
Dependent variable: sedentary				
Base model[a]	(Constant)	14%		
	Tertiary education complete[f]		Reference	
	No education beyond primary school[d]		0.33 (0.08-1.31)	.11
	No education beyond secondary school[e]		0.54 (0.17-1.69)	.29
	Tertiary education incomplete[f]		1.00 (0.40-2.50)	1.00
	Depression (IDB)		1.04 (0.99-1.09)	.09
	Work PA (BPAQ)		0.62 (0.43-0.90)	.01
Final model[b]	(Constant)	9%		
	Work PA		0.56 (0.39-0.81)	<.01
Final model adjusted[c]	(Constant)	9%		
	Work PA		0.57 (0.39-0.82)	<.01
	Age		0.99 (0.96-1.02)	.55
	Sex		1.38 (0.66-2.90)	.38

BPAQ, Baecke Habitual Physical Activity Questionnaire; *OR*, odds ratio; *PA*, physical activity.
[a] Base model: variable associated ($P < .20$).
[b] Final model: Statistically significant results ($P < .05$).
[c] Final model adjusted: by age and sex.
[d] In Brazil, primary schools provide education from age 5 to 11.
[e] In Brazil, secondary schools provide education from age 12 to 17.
[f] In Brazil, tertiary education provide education from age 18.

previous study from our group[67] with people with chronic LBP did not demonstrate acceptable validity between self-reported and objective physical activity measures.

Although previous studies showed that pain, disability, and depression[68] are associated with physical activity and sedentary behaviors in people with chronic LBP,[17,19,69] our results questioned the existing evidence. The lack of association might not be surprising, because half of our sample was still working. Hence, these people might continue to perform daily activities at work or at home despite of their pain intensity or disability level. Fear of movement is another psychosocial factor found not to be associated with physical activity and sedentary behaviors in the current study. This finding aligns with a recent study from our group,[45] which found that fear of movement may prevent people to perform movements with their spine (eg, twisting, bending over, and sitting) rather than interfering with the amount of physical activity performed during the week. Therefore, interventions aiming to reduce pain, disability, and psychosocial factors might not be sufficient to increase physical activity levels or reduce sedentary time of people with chronic LBP.

Strengths and Limitations

The current study has some strengths including the use of the Strengthening the Reporting of Observational Studies in Epidemiology Statement for Cross-sectional Studies. In addition, the novelty of the current study is that we measured physical activity and sedentary behaviors using objective method and different domains of physical activity using a self-report method. The use of these measures complement each other and provide information about intensity and domains of physical activity at the same time. Another advantage of the current study is that we investigated the association of a broad range of factors that could influence

the physical activity levels and sedentary behavior, while the previous studies tested the influence of individual factors. One of the limitations of this study is the cross-sectional design, which gives limited information about causality. Another limitation is that we only included people with chronic LBP symptoms, which does not allow the results to be generalized to people with acute and subacute LBP. In addition, the sample size used in the current study (n = 171) can be considered adequate for the numbers of variables included in the multivariable logistic regression analyses.[30,31] Finally, our study did not investigate the influence of other variables that could have association with physical activity and sedentary behavior and should be considered in additional studies, such as socioeconomic status.[70]

Conclusion

The results of this study showed that lower BMI and higher self-reported levels of non-sport leisure time physical activity were associated with being sufficiently physically active. For sedentary behavior, lower self-reported physical activity at work were associated with being sedentary in people with chronic LBP. Importantly, our study shows that pain intensity, disability, and psychosocial factors (ie, depression and fear of movement) often believed to be associated with physical activity and sedentary behaviors seems not to influence these behaviors in people with chronic LBP.

Funding Sources and Conflicts of Interest

Part of this project was funded by the Sao Paulo Research Foundation, grant number 2014/14077-8, and the National Council for Scientific and Technological Development, grant number 408712/2016-3. No conflicts of interest were reported for this study.

Contributorship Information

Concept development (provided idea for the research): C.B.O.
Design (planned the methods to generate the results): C.B.O., R.Z.P.
Supervision (provided oversight, responsible for organization and implementation, writing of the manuscript): C.B.O., R.Z.P.
Data collection/processing (responsible for experiments, patient management, organization, or reporting data): P.K.M.
Analysis/interpretation (responsible for statistical analysis, evaluation, and presentation of the results): T.M.D., C.B.O.
Literature search (performed the literature search): T.M.D.
Writing (responsible for writing a substantive part of the manuscript): T.M.D., C.B.O., R.Z.P.
Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): M.R.F., F.G.S., C.G., D.D.C., P.K.M.

Practical Applications

- Pain, disability, and psychosocial factors were not associated with physical activity or sedentary in people with chronic LBP.
- Time spent in work physical activity and leisure time were associated with reduced chances of patients with chronic LBP being sedentary and higher chances of being physically active.
- Interventions aiming to improve pain and disability, as well as psychosocial factors, may not be sufficient to increase physical activity of patients with chronic LBP.
- Further interventions aiming to change the patients' behavior with chronic LBP toward a healthy lifestyle should focus on stimulating the practice of physical activity during leisure time as well as during work.

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