

## HEALTH INDICATORS PREDICT LIFESTYLE IN RETIRED FEMALE TEACHERS

### INDICADORES DE SAÚDE PREDIZEM O ESTILO DE VIDA EM PROFESSORAS APOSENTADAS

### INDICADORES DE SALUD PREDICEN EL ESTILO DE VIDA EN MAESTRAS JUBILADAS

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#### ABSTRACT:

The objective of the study was to identify sociodemographic variables and health indicators capable of predicting lifestyle (LS) in forty retired teachers participating in a university extension project. This is a cross-sectional study, quantitative in nature and inferential in nature. An assessment form was used to record the participants' personal, sociodemographic data and health indicators. To assess LS, the questionnaire called 'Individual Lifestyle Profile' was used, consisting of the components of nutrition, physical activity, preventive behavior, social relationships and stress control. The data were analyzed using descriptive and inferential statistics. Multiple linear regression presented two statistical models to explain the variability in the LS of retired teachers ( $p < 0.05$ ). In the first, the number of falls was the only predictor ( $\beta = -0.411$ ;  $t = -2.776$ ;  $p = 0.008$ ), but with a medium effect size ( $R^2 = 0.169$ ). In the second model, sedentary behavior (SB) was added ( $\Delta R^2 = 0.098$ ;  $\Delta F = 4.942$ ;  $p = 0.032$ ) and was also a significant predictor for LS ( $\beta = -0.315$ ;  $t = -2.223$ ;  $p = 0.032$ ) of volunteers. Therefore, this study demonstrated that the number of falls and SB, taken together, were able to explain 26.7% of the variability in the volunteers' LS, which corresponded to a large effect size. This is an important outcome, as information about the factors that affect LS in this target audience is still limited.

**Keywords:** retirement; sedentary behaviour; lifespan; teachers; falls.

#### RESUMO:

O objetivo do estudo foi identificar as variáveis sociodemográficas e indicadores de saúde capazes de prever o estilo de vida (EV) em quarenta professoras aposentadas participantes de um projeto de extensão universitária. Trata-se de um estudo transversal, de natureza quantitativa e de cunho inferencial. Foi utilizada uma ficha de avaliação para registrar os dados pessoais, sociodemográficos e indicadores de saúde das participantes. Para avaliar o EV, foi utilizado o questionário denominado 'Perfil do Estilo de Vida Individual' constituído pelos componentes de nutrição, atividade física, comportamento preventivo, relacionamento social e controle do estresse. Os dados foram analisados a partir da estatística descritiva e inferencial. A regressão linear múltipla apresentou dois modelos estatísticos para explicar a variabilidade do EV das professoras aposentadas ( $p < 0,05$ ). No primeiro, o número de quedas foi o único preditor ( $\beta = -0,411$ ;  $t = -2,776$ ;  $p = 0,008$ ), porém com o tamanho de efeito médio ( $R^2 = 0,169$ ). No segundo modelo, o comportamento sedentário (CS) foi adicionado ( $\Delta R^2 = 0,098$ ;  $\Delta F = 4,942$ ;  $p = 0,032$ )

e também foi um preditor significativo para o EV ( $\beta = - 0,315$ ;  $t = - 2,223$ ;  $p = 0,032$ ) das voluntárias. Portanto, este estudo demonstrou que o número de quedas e o CS, tomados em conjunto, foram capazes de explicar 26,7% da variabilidade do EV das voluntárias, o que correspondeu a um tamanho de efeito grande. Trata-se de um desfecho importante, pois as informações acerca dos fatores que afetam o EV neste público-alvo ainda são limitadas.

**Palavras-chave:** aposentadoria; comportamento sedentário; estilo de vida; professoras; quedas.

#### **RESUMEN:**

El objetivo del estudio fue identificar variables sociodemográficas e indicadores de salud capaces de predecir el estilo de vida (EV) en cuarenta docentes jubilados que participan en un proyecto de extensión universitaria. Se trata de un estudio transversal, de carácter cuantitativo y de carácter inferencial. Se utilizó un formulario de evaluación para registrar los datos personales, sociodemográficos e indicadores de salud de los participantes. Para evaluar la EV se utilizó el cuestionario denominado ‘Perfil de Estilo de Vida Individual’, compuesto por los componentes de nutrición, actividad física, conducta preventiva, relaciones sociales y control del estrés. Los datos fueron analizados mediante estadística descriptiva e inferencial. La regresión lineal múltiple presentó dos modelos estadísticos para explicar la variabilidad en el EV de los docentes jubilados ( $p < 0,05$ ). En el primero, el número de caídas fue el único predictor ( $\beta = - 0,411$ ;  $t = - 2,776$ ;  $p = 0,008$ ), pero con un tamaño del efecto medio ( $R^2 = 0,169$ ). En el segundo modelo, se añadió el comportamiento sedentario (CS) ( $\Delta R^2 = 0,098$ ;  $\Delta F = 4,942$ ;  $p = 0,032$ ) y también fue un predictor significativo del EV ( $\beta = - 0,315$ ;  $t = - 2,223$ ;  $p = 0,032$ ) de los voluntarios. Por lo tanto, este estudio demostró que el número de caídas y CS, en conjunto, fueron capaces de explicar el 26,7% de la variabilidad en la EV de los voluntarios, lo que correspondió a un tamaño del efecto grande. Este es un resultado importante, ya que la información sobre los factores que afectan a los vehículos eléctricos en este público objetivo aún es limitada.

**Palabras clave:** jubilación; comportamiento sedentario; duración de la vida; profesores; caídas.

## Introduction

Lifestyle (LS) is a set of habits, choices and customs experienced by individuals throughout their lives and is related to a variety of aspects that reflect on their attitudes, values and health status. These habits are associated with the perception of quality of life that the individual brings with them (Nahas; Barros; Francalacci, 2000). The LS can change over the years, but this only happens if the person feels motivated to do so (King *et al.*, 2009; Deslippe *et al.*, 2023).

Previously, it was demonstrated that physical inactivity, inadequate diet, smoking, excessive alcohol consumption, stress and anxiety negatively influenced the LS of adults (Deslippe *et al.*, 2023). Furthermore, advancing age associated with changes in people's LS after retirement is a phenomenon increasingly discussed in modern society (Fang; Shi, 2022), since withdrawal from work activities is accompanied by changes in social relationships (Kauppi *et al.*, 2021). Fang e Shi (2022) added that retirement marks the transition of social roles, socioeconomic status and living environments of working people, which can impact their

psychological and physiological health. Therefore, the search for new occupations is essential for a successful transition during this period, as well as maintaining healthy interpersonal relationships and support from friends and family.

In this sense, the literature has indicated that an ideal LS for older people should include a balanced diet, regular physical exercise, not smoking, adequate sleep and participation in social activities (Kauppi *et al.*, 2021; Deslippe *et al.*, 2023). Furthermore, it was suggested that maintaining mental health care and practicing self-care positively affected the physical and mental well-being of adults and elderly people (Salami, 2010; Trudel-Fitzgerald *et al.*, 2016). On the other hand, the adoption of bad habits caused serious health problems, such as the development of chronic diseases (King *et al.*, 2009).

Willett *et al.* (2019) found that poor diet was responsible for more deaths in adults than smoking and alcohol consumption combined. The study found that a diet rich in processed foods and sugars and lacking in essential nutrients contributed to the development of cancer, chronic respiratory diseases and early death. Furthermore, it was shown that the lack of regular physical activity, smoking and excessive alcohol consumption were strongly associated with an increased risk of developing cardiovascular diseases, hypertension and diabetes (King *et al.*, 2009).

Therefore, it is important to monitor LS and the factors that influence it to understand how a person's habits affect their health over time, and also to identify possible interventions to promote healthy LS. From this perspective, a 20-year longitudinal study followed a group of middle-aged women who adopted a healthy LS, with a balanced diet, physical activity and control of anxiety and depression (Trudel-Fitzgerald *et al.*, 2016). The results showed that despite improvements in LS over the years among women, those who had more severe symptoms of anxiety and depression had a less healthy LS over their 20-years. Therefore, the authors suggested that psychological symptoms influenced changes in the volunteers' LS, affecting the maintenance of health behaviors over time and the probability of having a favorable LS in the future.

LS can be assessed through validated questionnaires and scales or instruments developed by the researchers themselves (Liao *et al.*, 2023). In this context, the pentacle of well-being has been used to evaluate the LS profile of adults and elderly people (Alves Faria *et al.*, 2022). It is a simple, self-administered instrument that includes five fundamental aspects of people's LS that affect general health and are associated with psychological well-being and various chronic diseases (Nahas; Barros; Francalacci, 2000).

The first aspect is nutrition, which assesses changes in eating behaviors. Another aspect is the level of habitual physical activity, in which people are expected to accumulate a certain amount of time of moderate or intense physical activity so that there is a minimum weekly caloric expenditure. In addition to these, preventive behavior (which involves the use of seat belts, sunscreen, condoms, safety equipment at work, not smoking, not using drugs and moderate consumption of alcoholic beverages), and the quality of relationships (which represents one of the fundamental components of spiritual well-being and quality of life) must be analyzed. Finally, stress control is also considered to study people's LS, as it addresses the set of factors that affect emotional balance (Nahas; Barros; Francalacci, 2000).

To date, no research has been found bringing together the factors that predict LS in retired teachers, as they have faced an intense working day over the years, marked by more than 40 hours a week and little free time for planning, which probably had an impact on their LS and health. Therefore, the objective of the study was to identify the sociodemographic variables and health indicators capable of predicting LS in retired teachers participating in a university extension project.

## Materials and Methods

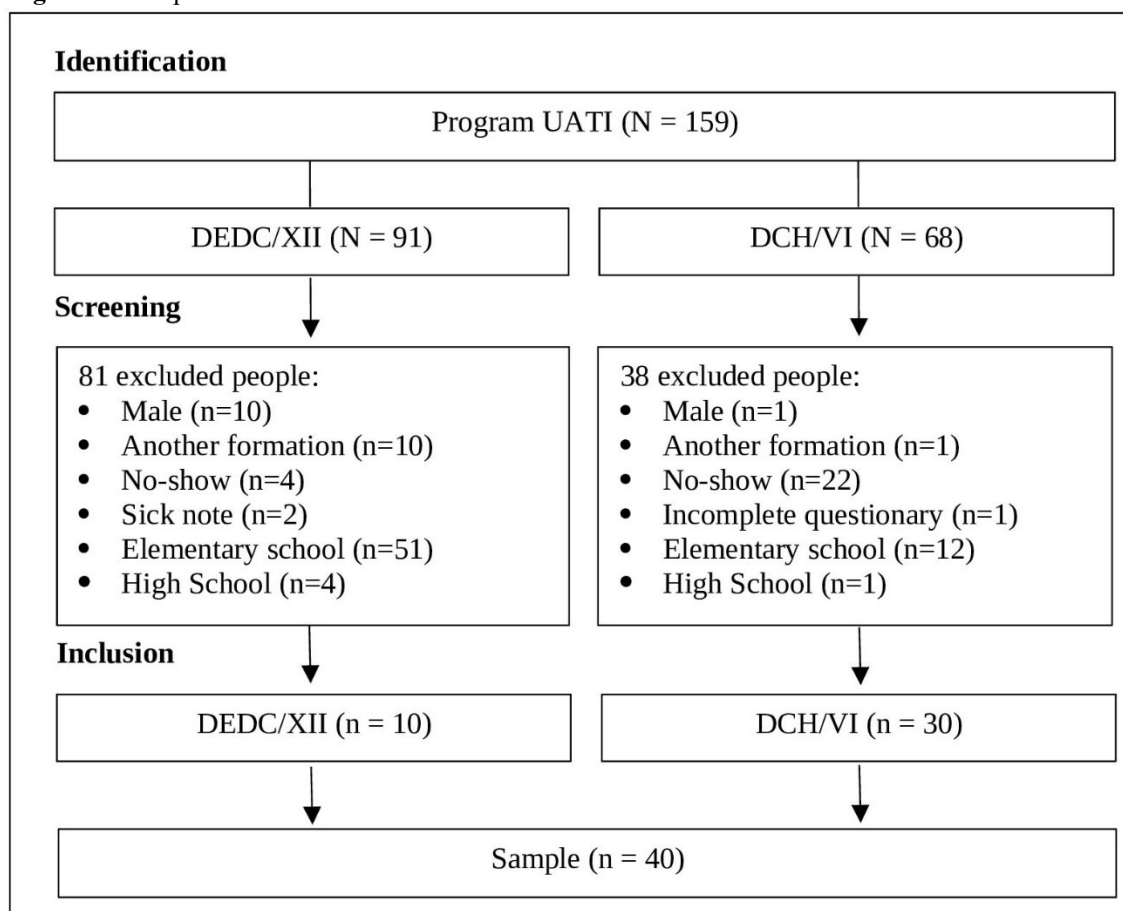
This is a cross-sectional study, of a quantitative nature and of an inferential nature, in which data collection took place at the Laboratory for Study, Research and Extension on Aging (LEPEEn) of the Department of Education/Campus XII (DEDC/XII) and at the Anísio Teixeira's House (ATH) in partnership with the Department of Human Sciences/Campus VI (DCH/VI), both from the State University of Bahia (UNEB).

LEPEEn is an academic laboratory equipped with resources that enable data collection and monitoring of research subjects involved in teaching, research and extension activities. All materials are portable, which makes it possible to serve people living in other locations. ATH is a cultural space located in the municipality of Caetité/Bahia that houses a public library and offers art education workshops, digital inclusion classes, among other activities. ATH also welcomes people to participate in physical activities, as it has large, airy spaces that allow for physical activities.

The study population consisted of people regularly enrolled in university extension projects of the Open University Program for the Elderly (UATI) of DEDC/XII (N = 91) and DCH/VI (N = 68), making a total of 159 subjects. All people were invited to participate in the

study. The sample consisted of membership, with 10 participants from DEDC/XII and 30 volunteers from DCH/VI, aged between 59 and 85 years. The following inclusion criteria were adopted: female; active enrollment at UATI; being a retired teacher; lucidity (this criterion was established based on speech coherence); and wanting to voluntarily participate in the research. The exclusion criteria were: people with training other than teaching or teaching; not completing the LS questionnaire; not attending data collection (Figure 1).

**Figure 1** - Sample selection.



Source: elaborated by the authors.

In the week before data collection, the researcher explained the study proposal to the volunteers and invited them to participate in the research, using simple and clear language. Then, he presented the free and informed consent form and explained its importance. Data collection was carried out by the researcher from May to July 2023.

After these procedures, an assessment form was used to record personal data (date of birth and sex), sociodemographic data (self-reported skin color, marital status, length of study, income, living arrangement) and health indicators (absence/presence of falls in the last year,

number of falls in the last year, self-reported illnesses, use and quantity of medications, sedentary behavior [SB], weekly frequency of physical activity, duration/time of each physical activity session and hours of sleep) of the participants .

SB was estimated by the total number of daily hours spent sitting based on the following question: ‘How much time do you spend sitting during the week? Please add up the total number of hours you spend sitting, regardless of the activity you do (eating, listening to the radio, watching television, reading, sewing, driving, etc.)’. The same question was asked with reference to a weekend day. The number of hours sitting per day was calculated as follows:  $[(\text{time sitting during a weekday} \times 5) + (\text{time sitting during a weekend day} \times 2)/7]$  (Leon-Munoz *et al.*, 2013).

To assess physical activity habits, the following questions were asked: ‘Currently, how many times a week do you perform physical activity?’ (possible answers: none to seven times); ‘How long is each physical activity session?’ (possible answers: I don’t exercise; less than 30 minutes – how long; between 30 and 60 minutes – how long; more than 60 minutes – how long); ‘How intense is this physical activity?’ (possible answers: I do not practice physical activity; light; moderate; and intense/vigorous); ‘What type of physical exercise do you currently do?’ (possible answers: water aerobics, walking, weight training, functional exercises, I don’t perform physical activity and others – open question). Based on the answers, the time spent (T) during each physical activity session was multiplied by the number of days of the week (F) in which the participant exercised (Botero *et al.*, 2021).

The average duration of hours of sleep per day was calculated as the weighted average of hours of sleep during the week and on the weekend, using the formula:  $[(\text{hours of the week} \times 5) + (\text{hours of the weekend} \times 2)/7]$  (Knutson *et al.*, 2006).

To assess LS, the questionnaire called ‘Individual Lifestyle Profile’ was applied, consisting of the components of nutrition, physical activity, preventive behavior, social relationships and stress control (Nahas; Barros; Francalacci, 2000). The questionnaire has 15 questions, divided into three questions for each aspect, which were evaluated on a scale *likert* of four points that varies between 0 (never) and 3 (always). A value of zero implies total absence of the analyzed characteristic and three indicates complete implementation of the behavior considered. Therefore, the range of the raw score for the overall LS ranged from 0 to 45 points.

Descriptive statistics with absolute and relative frequency distribution were used to present the categorical variables and the mean with standard deviation for the numerical variables. The normality of the data was verified with the test *Shapiro-Wilk*. The linearity of the parameters (scatter plot), homoscedasticity (randomly scattered points in the scatterplot),

absence of outlier (residual statistics table), independence between residues (Durbin-Watson test) and multicollinearity (Tolerance and variance inflation factor - VIF) were examined. Then, the multiple linear regression (MLR) method *stepwise*, was used to describe whether the study's independent variables could predict LS. The value of the coefficient of determination ( $R^2$ ) was calculated as a measure of the effect size for the MLR and the results were interpreted as small ( $\geq 0.02$ ), medium ( $\geq 0.13$ ) and large ( $\geq 0.26$ ) (Cohen, 1988).

The alpha adopted was 0.05. All analyzes were performed using the program *Statistical Package of Social Sciences* (SPSS) version 20.0 for Windows (IBM Inc., Chicago, IL, USA). Post-hoc power analysis was applied, and a *power* of 0.91 was verified considering two tested predictors, alpha error of 0.05 and effect size greater than 0.35 (large). The sample power was calculated using the G\*Power program version 3.1.9.7 (IL, USA).

This study met the requirements proposed by Resolution No. 466/2012 of the National Health Council and was approved by the Human Research Ethics Committee under opinion No. 6253310 and CAAE No. 70407323.3.0000.0057.

## Results

Table 1 presents the sociodemographic data of the study volunteers. It was found that self-reported skin color was equally distributed between whites and blacks (black and brown skin); just over half of the participants were divorced, widowed or single, but the majority lived with someone (children, grandchildren, sister or relative) and had an income of up to two minimum wages. The majority (80%) had a teaching degree, but there were teachers with degrees in history, pedagogy, literature, mathematics, philosophy, geography and biological sciences, with and without *lato sensu* specialization, which justifies the average study time of  $13.32 \pm 3,22$  years.

**Table 1** - Sociodemographic data of the volunteers.

Variables	Classification	Descriptive measure
Age years)	---	$68.57 \pm 6.41$
Study time (years)	---	$13.32 \pm 3.22$
Skin color	White	20 (50%)
	Black/Brown	20 (50%)
Marital status	Married/living with someone	19 (47,5%)

	Divorced/widowed/single	21 (52,5%)
Income	Up to 2-MW	23 (57,5%)
	More than 2-MW	17 (42,5%)
Home arrangement	Lives alone	10 (25%)
	Live with someone	30 (75%)

MW= minimum wage.

Source: prepared by the authors.

Table 2 presents some health indicators of the study volunteers. Retired teachers had an average age of  $68.57 \pm 6.41$  years, with 70% of them not falling in the last year. On the other hand, there was an average of  $1.57 \pm 1.15$  diseases in the group, with emphasis on hypertension and diabetes. 82.5% of participants used at least one medication, with the average consumption among them being  $2.70 \pm 2.22$  medications.

The volunteers were participants in a university extension project whose main characteristic was the promotion of bodily practices. On average, it was observed that the teachers completed  $160.87 \pm 80.23$  minutes of physical activity per week. Furthermore, they slept on average more than six hours a day and spent less than four hours a day in a sitting position.

**Table 2** - Health indicators of the volunteers.

Variables	Classification	Descriptive measure
Fall	Yes	12 (30%)
	No	28 (70%)
Number of falls	---	$0.57 \pm 1.10$
SAH	Yes	28 (70%)
	No	12 (30%)
Diabetes	Yes	10 (25%)
	No	30 (75%)
Number of diseases	---	$1.57 \pm 1.15$
Medicine	Yes	33 (82,5%)
	No	7 (17,5%)
Quantity of medicine	---	$2.70 \pm 2.22$
SB (hours/day)	---	$3.10 \pm 2.33$
T*F (min/week)	---	$160.87 \pm 80.23$
Sleep hours (hours/day)	---	$6.22 \pm 1.49$

SAH = systemic arterial hypertension; SB = sedentary behavior; T\*F = product between time and weekly frequency.

Source: prepared by the authors.

Table 3 shows the means and standard deviations of the LS components of the study participants. The Shapiro-Wilk test showed that the LS ( $W_{(40)} = 0.949$ ;  $p > 0.05$ ) presented a normal distribution. The 'social relationships' component of the LS stood out, as it reached the highest score among teachers, reaching almost 82% of the maximum score. On the other hand, the 'physical activity' component of the LS obtained the lowest average score. Furthermore, it



is important to consider that the range of raw scores for each LS component can vary from 0 to 9 points. Thus, it was observed that all LS components exceeded, on average, half the maximum score (4.5 points).

The overall gross LS score corresponds to a sum of the scores obtained in the five components. On average, the volunteers obtained  $32.62 \pm 6.73$  points, which represented approximately 73% of the maximum score.

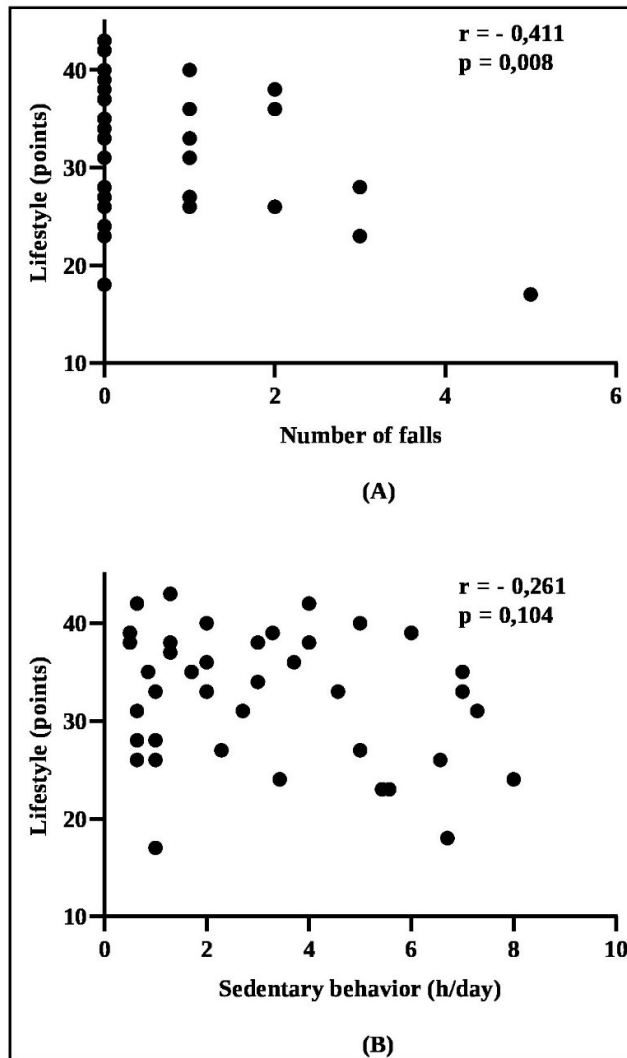
**Table 3** - General lifestyle and its components.

	<b>Study Variables</b>	<b>Descriptive measure</b>
Lifestyle Components (points)	Nutrition	$6.60 \pm 1.58$
	Physical activity	$5.67 \pm 2.08$
	Preventive Behavior	$7.12 \pm 1.96$
	Social Relationship	$7.35 \pm 1.86$
	Stress Control	$5.87 \pm 1.75$
	General lifestyle (points)	$32.62 \pm 6.73$

Source: Prepared by the authors.

Figure 2 shows the relationship between the number of falls and SB with the LS of retired teachers. The number of falls showed a significant and inversely proportional association with the participants' LS (Figure 2 A). On the other hand, SB was not associated with LS (Figure 2 B).

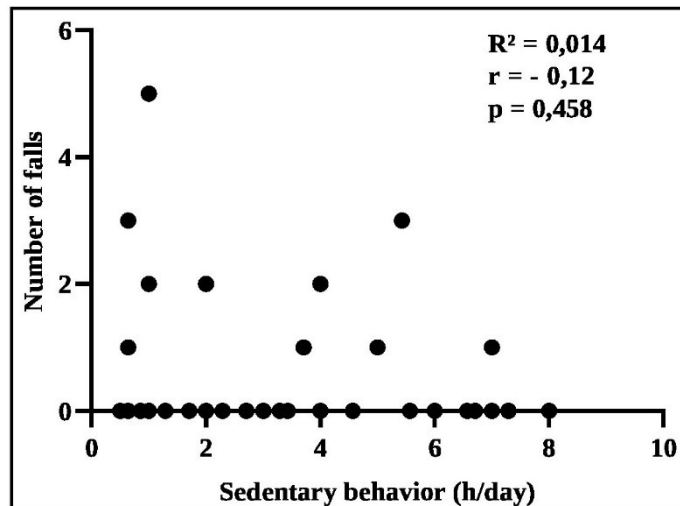
**Figure 2** - Association between number of falls, SB and LS.



Source: prepared by the authors.

Next, MLR was performed, a method *stepwise*, to identify the variables capable of predicting the general LS in volunteers. Preliminary analysis ensured that the assumptions of normality, linearity, homoscedasticity, absence of *outlier* and independence between residuals (Durbin-Watson = 1.912). Furthermore, the correlation between the predictor variables included in the model was examined and found to be weak ( $r = -0.12$ ) (Figure 3). Tolerance (Tol = 0.985) and variance inflation factor (VIF = 1.015) values were also identified, indicating that multicollinearity was not a problem.

**Figure 3** - Association between number of falls and SB.



Source: prepared by the authors.

Therefore, the MLR analysis resulted in two statistically significant models. In the first model, the number of falls explained 16.9% of the variability in LS ( $F_{(1,38)} = 7.705$ ;  $p = 0.008$ ;  $R^2 = 0.169$ ) and was its only predictor ( $\beta = -0.411$ ;  $t = -2.776$ ;  $p = 0.008$ ). In the second model, the number of falls and SB explained 26.7% of the variability in LS ( $F_{(2,37)} = 6.723$ ;  $p = 0.003$ ;  $R^2 = 0.267$ ), which corresponded to a large effect size (Cohen, 1988). The effect of both predictors was significant: number of falls ( $\beta = -0.449$ ;  $t = -3.163$ ;  $p = 0.003$ ); SB ( $\beta = -0.315$ ;  $t = -2.223$ ;  $p = 0.032$ ). The equations that describe the relationship between the predictors and the LS in each model are found in Table 4.

**Table 4** - Multiple linear regression using LS as dependent variable.

	R <sup>2</sup>	Adjusted R <sup>2</sup>	Change Statistics			SC	UC		CI 95% (B)
			$\Delta R^2$	$\Delta F$	p	Beta	B	SE	
<b>Model 1</b>	0.169**	0.147	0.169	7.705	0.008				
Falls						-0.411**	-2.499	0.900	-4.321/-0.676
Equation						<b>LS = 34.062 - 2.499 x (Q)</b>			
<b>Model 2</b>	0.267**	0.227	0.098	4.942	0.032				
Falls						-0.449**	-2.730	0.863	-4.479/-0.981
SB						-0.315*	-0.911	0.410	-1.742/-0.081
Equation						<b>LS = 37.021 - 2.730 x (Q) - 0.911 x (SB)</b>			

R<sup>2</sup> = coefficient of determination; SC = standardized coefficient; UC = unstandardized coefficient; CI = confidence interval;  $\Delta R^2$  = change in R<sup>2</sup>;  $\Delta F$  = change in F ratio (statistical test used in ANOVA); SE = standard error; LS = lifestyle; Q = number of falls; SB = sedentary behavior (h/day in a sitting position); n = 40; \* p < 0.05; \*\* p < 0.01.

Source: prepared by the authors.

## Discussion

The results of the study identified that the best model to predict the LS of retired teachers included two health indicators, as the number of falls, alone, had only a moderate effect ( $R^2 = 0.169$ ;  $p = 0.008$ ) on the outcome. Thus, the change statistic in  $R^2$ , responsible for informing when new factors are added to the model, suggested that the change resulting from the inclusion of the second predictor (SB) contributed significantly to explaining the variability in the LS of the study participants (Table 4). Furthermore, it was found that the effect size of model 2 ( $R^2 = 0.267$ ;  $p = 0.003$ ) approached Cohen's (1988) convention for a large effect ( $R^2 > 0.26$ ), that is, the number of falls and SB, together, were good predictors for the volunteers' LS, confirming the strength of the relationship between these variables. Although no specific research was found on the LS of retired teachers, it was found that self-efficacy, expectations regarding retirement, perceived stress and optimism were determining factors in understanding life satisfaction ( $R^2 = 0.54$ ) and symptoms of depression ( $R^2 = 0.52$ ) in retired teachers aged 52 to 75 years (Salami, 2010). The author used two Likert scales, with 20 items each, to assess the symptoms of depression and life satisfaction of the volunteers. These psychological domains are recognized in the literature for affecting people's LS (Trudel-Fitzgerald *et al.*, 2016).

The number of falls reported in the last year was the main predictor of the participants' LS ( $\beta = -0.449$ ;  $p = 0.003$ ). In other words, it was observed that retired teachers who suffered more falls in the last year had a more negative perception of LS. Similarly, the occurrence of falls in women over the age of 60 was associated with changes in LS, especially an increase in depressive symptoms and urinary incontinence (Gale *et al.*, 2018), while in another research, persistent fear of falling affected the physical and psychosocial well-being of elderly women (Peeters *et al.*, 2015). These changes in LS caused by falls can be attributed to concerns about injuries, fractures and hospitalization, since falls are considered a public health problem that can affect the functional autonomy of older people (Nicolas *et al.*, 2023).

SB, estimated by the total daily hours spent sitting, resulted in an average of  $3.10 \pm 2.33$  h/day, with volunteers with lower SB having a better score for LS. A systematic review of SB in older adults demonstrated that the mean total time in the sitting position ranged from  $5.3 \pm 0.1$  h/day (self-reported time) to  $9.4 \pm 1.0$  h/day (device monitoring) (Harvey; Chastin; Skelton, 2015). Although the mean SB values in the present study are 41.5% below the self-reported time in the study by Harvey, Chastin and Skelton (2015), there is evidence suggesting that adults who spend more than 3 h/day sitting may have their expectation of life reduced by 2 years, even if they exercise regularly (Katzmarzyk; Lee, 2012). Furthermore, a longitudinal survey confirmed that elderly women with a mean age of  $78.23 \pm 1.45$  years who sat for 8-11

hours/day had a 1.45 times greater chance of dying compared to those who spent less than 4 h/day sitting (Pavey; Peeters; Brown, 2015). In another longitudinal investigation, adult women aged 45 or over who sat for more than 11 h/day were 1.62 times more likely to die when compared to those who spent less than 4 h/day sitting (Van der Ploeg *et al.*, 2012).

In this sense, SB has been considered an element that affects people's LS, since prolonged time in the sitting position has also been related to an increase in triglyceride levels and accumulation of abdominal fat in elderly women (Gardiner *et al.*, 2011) and reduced cognitive capacity in adults and the elderly (Kesse-Guyot *et al.*, 2012). Additionally, there is evidence that points to SB as a risk factor for obesity, hypertension, diabetes, cardiovascular diseases, reduced life expectancy and all-cause mortality (Van der Ploeg *et al.*, 2012; Pavey; Peeters; Brown, 2015; Dogra *et al.*, 2017).

Furthermore, excessive and prolonged sitting can increase insulin resistance, vascular dysfunction, visceral fat, blood lipid concentration and inflammation, and decrease cardiorespiratory capacity, bone density, muscle mass and strength (Pinto *et al.*, 2023). In older individuals, greater SB was directly related to the incidence of developing dementia (Raichlen *et al.*, 2023). From these findings, it is clear that the high prevalence of a sedentary lifestyle represents a serious public health problem, contributing to premature aging (Raffin *et al.*, 2023).

A 2-year longitudinal study examined changes in the physical activity level and sedentary time of retired people. The average age of participants at the beginning of the study was  $62.4 \pm 2.2$  years, 52.7% had higher education and 74.9% lived with a partner. The main changes identified were the reduction in cycling in free time and a slight increase in voluntary walking related to physical activities of moderate to vigorous intensity. Furthermore, retirees with a lower educational level showed a significant decrease in walking time as a means of transport and an increase in time spent watching television and using the computer (Van Dyck; Cardon; De Bourdeaudhuij, 2016). Therefore, it is advisable to encourage the practice of physical activities for a longer period of time (regardless of the intensity), and to interrupt prolonged periods in the sitting position, as these attitudes are fundamental to adopting and maintaining a more active LS among adults and elderly people (Gardiner *et al.*, 2011; Dogra *et al.*, 2017).

Associated with low SB, our research showed that the habit of physical activity resulted in an average of  $160.87 \pm 80.23$  min/week, with 62.5% of volunteers reporting a moderate intensity during their training. Furthermore, we found that water aerobics, gymnastics (combination of aerobic and strength exercises) and walking were the modalities most practiced by the participants, corroborating the findings of other investigations (Del Duca *et al.*, 2014).

These results reinforce the recommendations of Brazilian and American guidelines on the regular practice of physical activity, in which at least 150 minutes of moderate exercise per week are necessary to promote a healthy LS in adults and elderly people (Brasil, 2021; Piercy *et al.*, 2018).

Adults should do at least 150 minutes to 300 minutes a week of moderate-intensity, or 75 minutes to 150 minutes a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. They should also do muscle-strengthening activities on 2 or more days a week. Older adults should do multicomponent physical activity that includes balance training as well as aerobic and muscle-strengthening activities (Piercy *et al.*, 2018).

Despite the recognition of the benefits of physical exercise for healthy aging, some evidence has already indicated that SB resulted in undesirable health effects, regardless of people's physical activity levels (Katzmarzyk; Lee, 2012; Raffin *et al.*, 2023). Therefore, the physical activity guide for the Brazilian population recommends that, whenever possible, people reduce the time they spend sitting or lying down watching television or using devices such as cell phones, computers or tablets. The suggestion is that, every hour, move for at least 5 minutes and take the opportunity to change position and stand, go to the bathroom, drink water and stretch your body. Small attitudes that can help reduce SB and improve quality of life (Brasil, 2021).

The model proposed by MLR did not indicate the habit of physical activity as a determining predictor for LS in retired teachers. However, the literature has already demonstrated a significant interaction between sitting time and the level of physical activity with an increased risk of mortality in women who sat for more than 8 h/day and did not comply with the guidelines for the minimum time of weekly physical activity (Pavey; Peeters; Brown, 2015; Piercy *et al.*, 2018). Thus, this evidence confirms the importance of reducing the daily time spent in the sitting position in an attempt to promote a healthy LS and prevent chronic diseases in adults and elderly people.

The study had some limitations: (1) cross-sectional research does not allow establishing cause and effect relationships and is not capable of identifying the elements that influence the participants' LS over time. In view of this, we recommend carrying out longitudinal scientific work; (2) SB was estimated through participants' self-report; in this case, we recommend that future investigations incorporate SB monitoring with a device; (3) just one instrument to track the LS of the sample can underestimate or overestimate the relationship with the other study variables; for this reason, we propose the use of another instrument to minimize this bias and

to verify the consistency of the data obtained by the different instruments; (4) the sample was selected from an academic extension program, so care must be taken when generalizing the results.

However, our research advanced in other aspects: (1) we developed a mathematical model to explain the LS of retired teachers; (2) we demonstrate the magnitude of each LS predictor variable; and (3) the presentation of the effect size indicated how much the independent variables (number of falls and SB) affected the dependent variable (LS), confirming its practical importance.

## Conclusion

This study demonstrated that the number of falls and SB were good predictors for the LS of retired teachers. Taken together, they were able to explain 26.7% of the volunteers' LS variability. This is an important outcome, as information about the factors that affect LS in this target audience is still limited.

Based on the aforementioned considerations, we suggest: (1) it is necessary to understand that falls represent an adversity for the volunteers' LS. Therefore, public health programs must implement measures to prevent falls, such as including physical activity in the routine, to improve the well-being of these people; (2) tracking the main factors that motivate retired teachers to regularly practice physical activity and other entertainment. This approach is essential to reduce sedentary time, as including exercise throughout the day can encourage these people to move more and spend less time watching television. Consequently, this practice can mitigate health problems associated with a sedentary lifestyle and promote better LS; (3) continuous monitoring of LS and the factors that influence it, in order to improve health promotion strategies over the years; and (4) carrying out studies that broaden and deepen the discussion on the factors that influence not only the LS of retired teachers, but also their well-being, quality of life and other subjective states.

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