Biopsychosocial Inequality, Active Lifestyle and Chronic Health Conditions In Brazilians

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Abstract

Background:A study estimated the biopsychosocial factors related to active physical behavior in the Brazilian population with and without chronic non-transmissible disease (CNCD).

Methodology: Cross-sectional study of the National Health Survey (NHS) in Brazil, with 60,202 individuals. The outcome was physically active behavior. The independent variables were social characteristics, lifestyle and health. Cox regression was applied to estimate the prevalence ratio (PR).

Results: 29,666 (48.3%; 95% CI: 47.0–50.0) reported having CNCD. Not being a smoker or alcoholic, living in an urban area, having informal social support, you are in class A, high schooling as well as paid work are more associated with active lifestyle in both groups. However, in the group without CNCD, the female sex, having some disability and not having private health insurance were more associated with sedentary behavior, while in the group with CNCD, being elderly, white and not having restful sleep are associated with sedentary lifestyle.

Conclusion: People with and without CNCD in Brazil have very close active behavior, however, some biopsychosocial factors such as: sex, age, lifestyle, socioeconomic level are unevenly associated with the active lifestyle in the groups. Thus, therapeutic or preventive proposals as well as public policies for health promotion must observe these distinctions when elaborating their actions.

Background

The World Health Organization (WHO) recommends performing at least 150 minutes of moderate physical activity or 75 minutes of vigorous physical activity weekly for an individual to be considered physically active and to obtain health benefits. Furthermore, adding resistance, flexibility and balance training are essential to enhance the benefits generated by physical exercise, including the prevention and decreased progression of chronic non-communicable diseases (NCDs) and deaths for all causes. [1]

NCDs have slow progression and they are generally composed by mental, cardiovascular, metabolic, respiratory, neoplastic and musculoskeletal diseases.[2] They are responsible for 74% of deaths in Brazil and about 45% of the adult population report having at least one of these conditions. [3] Considering that sedentary people have a 20–30% higher risk of death from chronic diseases when compared to physically active people, regular physical activity has a considerable role in preventing and reducing the progression of NCDs, therefore it is included within the Strategic Action Plan for Tackling Chronic Non-communicable Diseases in Brazil 2011–2022. [4–6]

Regular physical activity provides several health benefits as a strategy for promoting individual and collective health, such as cardiovascular fitness, reduced body weight and improved glucose metabolism, which prevent important chronic diseases. [7] Despite so many benefits, the number of people who are considered physically active in Brazil is low. About 45% of the Brazilian population is considered sedentary, because of multiple factors, such as the lack of social and/or behavioral support. [8,9] However, people with NCDs greatly benefit from regular active behavior, that helps to mitigate the disabilities produced by morbidity and, sometimes, reversing their progression.

Social determinants address, in general, the living and working conditions of individuals that somehow determine their health. [10] Strictly, when it comes to health, identifying these determinants and discussing disparities in living and working conditions, access to health services and availability of public health resources are essential to reduce health inequities and to improve the living conditions of the population. [11]

There is strong evidence that high socioeconomic levels are associated with a higher level of leisure-time physical activity and, therefore, it is associated with better health in general, whereas most physical activity is work-related among the population of lower socioeconomic levels. [12,13] Social determinants strongly influence healthy behavior, maintaining or deepening social disparities regarding self-care in health, responsible for NCD control and their morbidity and mortality rates. Studies show that inequalities in education and race are related to the presence of chronic diseases [14–16] and may modulate active behavior together with other factors.

Strategies aimed at reducing these inequalities can impact NCD reduction in different populations, especially in the most vulnerable ones. [8] Paradoxically, as a result of the low investment in promoting physical activity, there may be an increase in the medium to long term in expenses with treatment for NCDs and early deaths. [17] Therefore, understanding the conditioning factors of active behavior in people without NCDs is as important as in those with NCDs in order to outline specific actions for primary prevention in this population and manage previously installed conditions.

Hence, it is necessary to estimate the relationship that biopsychosocial factors establish in the physically active behavior of people with and without NCDs. We hypothesize that biopsychosocial conditions have different relationships between people with and without NCDs, which may possibly create a great vicious cycle of maintaining sedentary behavior in these subpopulations.

Method

This is a cross-sectional study from the Brazilian National Health Survey (NHS) database, developed in 2013 by the Brazilian Institute of Geography and Statistics (IBGE) in partnership with the Oswaldo Cruz Foundation. This research was approved by the National Committee for Ethics in Research under the number 10853812.7.0000.0008. The planning and conception of this research followed the criteria guided by STROBE guidelines.

NHS population includes permanent residents, grouped in census sections in state capitals, metropolitan regions and cities, and it excludes indigenous villages, military bases and barracks, camps, inns, boats, penitentiaries, penal colonies, prisons, jails, orphanages, convents and hospitals. The sample size was determined from the 2010 Demographic Census conducted by IBGE, the population groups of interest were selected and a sample size of 81,357 individuals aged over 18 years was estimated. Sampling took place by conglomerates, first stage was the census sector, followed by households in the sector and then the resident by simple random sampling.

Participants were divided into two groups (non-NCD and NCD) and responded to a research instrument organized by thematic modules from A to W. The modules that involve individual characteristics of residents, such as demographic, social, lifestyle, health perception, chronic illnesses and household characteristics were analyzed. The independent variables were grouped according to the NHS modules and were listed in Table 1.

The outcome of the study was a minimal of 150 min of exercise per week, measured through self-report in the questioning: "In general, on the day you practice exercise or sports, how long does this activity last?", generating a continuous variable.

The independent variables were grouped according to the NHS modules. Demographic variables: sex (male or female), elderly (yes/no), living with spouse (yes/no), race (white or non-white), paid work (yes/no) and social class, (A, B, C and DE). The social class was generated from the Brazilian Economic Classification Criteria developed by the Brazilian Research Companies Association (ABEP)[11].

The health variables were: NCD (yes/no), number of NCDs, self-reported presence of sleep complaints based on the question "In the past two weeks, how often did you have problems for not feeling rested and willing during the day, feeling tired, without energy?", which also generated an ordinal variable with the responses: "no day", "less than half the days" and "more than half the days/almost every day" that were transformed into a dichotomous variable (yes/no) for restful sleep; chronic disease patient (yes/no) and disability for activities of daily living (yes/no). Disability measured by the presence of physical, mental and/or sensory disability (yes/no); Body Mass Index (BMI) was measured in kg/m^2.

The health perception variables were general health perception (good, regular or poor), depressive symptoms perception (yes/no), and behavioral lability perception (yes/no). Lifestyle variables were smoking (yes/no) and drinking (yes/no). Social network variables were based on the question "how many family members or relatives and friends you feel at ease and can talk about almost everything?". This variable was stratified into less than 2 people, 3–5 people, 6–10 people, 11–15 people, 16–20 people and 21 or more people. Household variables were location of the household (urban or rural).

In complex sampling design, the data analysis is based on the weighted estimation of the sample units of the last stage. The data were described using estimates of prevalence and their 95% confidence intervals (CI95%). The association inferences between the outcome and the independent variables were analyzed by Cox Regression, with adjustment for complex design, and by Wald x^2 significance test. In addition, prevalence ratio (PR) estimation was determined as effect measurement and $\alpha \leq 0,05$. Models were stratified for individuals with and without chronic non-communicable disease.

Results

In this study, 60,202 individuals were evaluated, 30,536 (51.7%; CI95%: 51.0-52.5) of these reported not having any NCDs, whereas 29.666 (48.3%; CI95%: 47.0–50.0) reported having at least one of them. We identified only 20.7% (CI95%: 19.8–21.6) active individuals without NCDs and 17.5% (CI95%: 16.7–18.3) with NCDs. More characteristics of these groups are shown in Table 1.

Table 1
Characterization of the sample according to the health condition for chronic non-communicable diseases (NCDs).

		Non-NCD				NCD			
Variables		n	%	CI-95%	PR_{crude} (CI95%)	N	%	CI-95%	PR_{crude}(CI95%)
Sex	Male	14997	51.6	(50.6–52.6)	**1.36 (1.24–1.50)**	10923	38.6	(37.6–39.6)	0.98 (0.88–1.09)
	Female	15539	48.4	(47.4–49.4)	1	18743	61.4	(60.4–62.4)	1
Elderly	No	27941	91.5	(90.9–92.1)	**1.87 (1.50–2.32)**	21084	71.0	(69.9–71.9)	**1.45 (1.29–1.62)**
	Yes	2595	8.5	(7.9–9.1)	1	8582	29.0	(28.1–30.1)	1
Race	White	11543	45.4	(44.4–46.5)	**1.21 (1.10–1.33)**	12563	50.0%	(48.9–51.1)	**1.17 (1.06–1.30)**
	Non-white	18993	54.6	(53.5–55.6)	1	17103	50.0%	(48.9–51.1)	1
Education	Illiterate	1635	4.7	(4.2–5.2)	**0.94 (0.13–0.28)**	2809	8.2	(7.7–8.8)	**0.16 (0.12–0.21)**
	Literate	2153	7.6	(7.0-8.2)	**0.17 (0.12–0.24)**	5626	20.6	(19.7–21.6)	**0.28 (0.24–0.33)**
	Elementary education	8384	26.8	(25.9–27.8)	**0.34 (0.29–0.40)**	7771	25.8	(24.8–26.8)	**0.35 (0.30–0.41)**
	High education	11867	40.1	(39.1–41.2)	**0.64 (0.57–0.71)**	8159	27.7	(26.8–28.6)	**0.61 (0.54–0.69)**
	Higher education	6497	20.8	(19.8–21.8)	1	5301	17.7	(16.7–18.8)	1
Living with spouse	Yes	17541	58.4	(57.4–59.5)	**0.65 (0.59–0.72)**	16981	64.6	(63.6–65.5)	**0.88 (0.79–0.97)**
	No	12995	41.6	(40.5–42.6)	1	12685	35.4	(34.5–36.4)	1
Paid work	Yes	19647	65.0	(63.9–66.0)	**1.26 (1.14–1.39)**	14343	49.3	(48.3–50.3)	**1.28 (1.15–1.42)**
	No	10889	35.0	(34-36.1)	1	15323	50.7	(49.7–51.7)	1

		Non-NCD				NCD			
Health Insurance	Yes	7708	28.0	(26.9–29.1)	**1.95 (1.77–2.15)**	8660	32.9	(31.7–34.2)	**1.89 (1.71–2.09)**
	No	22828	72.0	(70.9–73.1)	1	21006	67.1	(65.8–68.3)	1
BMI					0.99 (0.98-1.00)				1.00 (0.99-1.00)
Drinking	No	17629	55.9	(54.8–57.0)	**0.65 (0.59–0.71)**	19571	64.7	(63.6–65.7)	**0.62 (0.56–0.68)**
	Yes	12907	44.1	(43.0-45.2)	1	10095	35.3	(34.3–36.4)	1
Smoking	Yes	4332	14.2	(13.5–14.9)	**0.60 (0.52–0.71)**	4397	15.2	(14.5–15.9)	**0.63 (0.54–0.74)**
	No	26204	85.8	(85.1–86.5)	1	25269	84.8	(84.1–85.5)	1
Informal social support	3–5 people	10482	34.2	(33.2–35.3)	**1.42 (1.28–1.60)**	9352	31.9	(30.9–32.8)	**1.49 (1.33–1.68)**
	6–10 people	5533	19.2	(18.4–20.1)	**1.72 (1.51–1.97)**	5677	20.6	(19.7–21.5)	**1.79 (1.56–2.04)**
	11–15 people	1464	5.2	(4.8–5.7)	**1.53 (1.26–1.86)**	1610	5.6	(5.1-6.0)	**1.88 (1.55–2.28)**
	16–20 people	473	2.0	(1.7–2.4)	**1.82 (1.36–2.43)**	629	2.2	(1.9–2.5)	**1.79 (1.32–2.41)**
	21 or more people	554	2.2	(1.8–2.6)	**1.93 (1.42–2.61)**	720	2.8	(2.5–3.2)	**1.51 (1.07–2.13)**
	2 or less people	12030	37.1	(36.0-38.2)	1	11678	36.9	(35.9–38.0)	1
Social Class	D/E	13291	37.0	(35.9–38.1)	**0.14 (0.08–0.24)**	13452	37.3	(36.3–38.4)	**0.22 (0.12–0.37)**
	C	13036	46.9	(45.8–48.0)	**0.24 (0.14–0.40)**	12065	45.1	(44.0-46.2)	**0.38 (0.22–0.66)**
	B	4127	15.6	(14.7–16.6)	**0.41 (0.24–0.69)**	4062	17.0	(15.9–18.2)	0.78 (0.45–1.35)
	A	82	0.5	(0.3–0.7)	1	87	0.6	(0.4–0.8)	1

		Non-NCD				NCD			
Depressive symptoms perception	No	23325	78.4	(77.5–79.3)	1.03 (0.92–1.15)	16529	57.2	(56.1–58.3)	**1.27 (1.15–1.41)**
	Yes	7211	21.6	(20.7–22.5)	1	13137	42.8	(41.7–43.9)	1
Behavioral lability perception	No	25544	84.8	(84.1–85.6)	**1.19 (1.04–1.37)**	19747	67.4	(66.4–68.4)	**1.35 (1.22–1.49)**
	Yes	4992	15.2	(14.4–15.9)	1	9919	32.6	(31.6–33.6)	1
Restful sleep	No	24665	81.7	(80.8–82.6)	1.09 (0.97–1.22)	17685	60.4	(59.3–61.4)	**1.35 (1.21–1.50)**
	Yes	5871	18.3	(17.4–19.2)	1	11981	39.6	(38.6–40.7)	1
Daily energy and tiredness	Yes	23904	79.0	(78.1–79.8)		17520	60.4	(59.3–61.4)	
	No	6632	21.0	(20.2–21.9)		12146	39.6	(38.6–40.7)	
General health perception	Good	24638	82.2	(81.4–83.0)	**3.92 (2.31–6.65)**	14503	49.7	(48.7–50.8)	**3.67 (2.93–4.60)**
	Regular	5328	16.2	(15.5–17.0)	**1.98 (1.15–3.42)**	11869	40.1	(39.1–41.1)	**2.03 (1.60–2.56)**
	Poor	570	1.6	(1.3–1.8)	1	3294	10.1	(9.6–10.7)	1
Disabilities	No	29079	95.3	(94.8–95.7)	**1.64 (1.27–2.13)**	25599	86.2	(85.4–86.9)	**1.547 (1.34–1.84)**
	Yes	1457	4.7	(4.3–5.2)	1	4067	13.8	(13.1–14.6)	1
Housing									
	Urban	24842	85,8	(85,1–86,5)	2,22 (1,92 – 2,56)	24403	87,1	(86,4–87,7)	2,09 (1,70 – 2,56)
	Rural	5694	14,2	(13,5–14,9)			12,9	(12,3–13,6)	

The groups differ proportionally regarding sex, with more women (61.4%) in the NCD group and more men (51.6%) in the non-NCD group. The NCD group is also composed of older people (29.0%) as well as people who report more depressive symptoms, emotional lability, poor health perception and disabilities. People without NCD showed less restful sleep (Table 1).

The associations between independent variables and active lifestyle for individuals with and without NCDs were analyzed and we identified that all of them were related to at least one of the groups or both in the crude model ($p \leq 0.05$), with the exception of BMI (Table 1).

In the adjusted model (Table 2), it is evident that household location, education, having paid work, smoking, drinking and health perception are associated with an active lifestyle in both groups and are not factors that generate inequalities between people with and without NCDs, but inequalities in general population.

Table 2
Adjusted model for the association between individual and contextual characteristics with active lifestyle in subjects with and without chronic non-communicable diseases (NCDs) in Brazil.

Parameter	Non-NCD			NCD		
	$PR_{Adjusted}$	CI95%		$PR_{Adjusted}$	CI95%	
Housing						
Urban	**1.44**	**1.23**	**1.68**	**1.38**	**1.08**	**1.75**
Rural	1			1		
Informal social support						
21 people or more	1.62	1.24	2.12	**1.19**	**1.051**	**1.349**
16–20 people	1.20	0.86	1.66	**1.37**	**1.19**	**1.58**
11–15 people	1.17	0.97	1.41	**1.53**	**1.27**	**1.85**
6–10 people	**1.26**	**1.10**	**1.44**	**1.46**	**1.07**	**1.99**
3–5 people	**1.17**	**1.049**	**1.31**	1.30	0.90	1.86
2 people or less	1			1		
Social Class						
DE	**0.43**	**0.25**	**0.73**	**0.46**	**0.26**	**0.80**
C	**0.46**	**0.27**	**0.77**	**0.53**	**0.31**	**0.91**
B	**0.58**	**0.34**	**0.97**	0.76	0.45	1.29
A	1			1		
Sex						
Male	**1.42**	**1.28**	**1.57**	0.94	0.83	1.06
Female	1			1		
Elderly						
No	1.23	0.98	1.55	**1.22**	**1.05**	**1.42**
Yes						
Race						
White	0.91	0.82	1.00	**0.85**	**0.77**	**0.95**
Non-white	1			1		
Living with spouse						
Yes	0.67	0.61	0.74	0.85	0.76	0.94
No	1			1		
Education						

Parameter	Non-NCD			NCD		
	$PR_{Adjusted}$	CI95%		$PR_{Adjusted}$	CI95%	
Illiterate	**0.34**	**0.23**	**0.51**	**0.33**	**0.24**	**0.46**
Literate	**0.28**	**0.20**	**0.40**	**0.52**	**0.42**	**0.63**
Elementary education	**0.54**	**0.45**	**0.65**	**0.62**	**0.52**	**0.75**
High education	**0.83**	**0.74**	**0.94**	**0.84**	**0.73**	**0.96**
Higher education	1			1		
Paid work						
Yes	**0.87**	**0.78**	**0.96**	**0.89**	**0.79**	**0.99**
No	1			1		
Health insurance						
Yes	**1.26**	**1.13**	**1.41**	1.04	0.92	1.17
No	1			1		
Smoking						
Yes	**0.64**	**0.553**	**0.76**	**0.69**	**0.58**	**0.81**
No	1			1		
Drinking						
Yes	**0.77**	**0.70**	**0.85**	**0.77**	**0.69**	**0.85**
No	1			1		
General health perception						
Good	**2.32**	**1.38**	**3.90**	**2.04**	**1.60**	**2.61**
Regular	**1.84**	**1.08**	**3.15**	**1.55**	**1.21**	**1.99**
Poor	1			1		
Disabilities						
No	**1.31**	**1.03**	**1.66**	1.18	0.99	1.40
Yes	1			1		
Behavioral lability perception						
No	1.05	0.90	1.21	1.04	0.919	1.18
Yes	1			1		
Depressive symptoms perception						
No	0.91	0.80	1.02	0.95	0.84	1.08
Yes	1			1		

Parameter	Non-NCD			NCD		
	$PR_{Adjusted}$	CI95%		$PR_{Adjusted}$	CI95%	
Restful sleep						
Yes	1.09	0.973	1.23	**1.23**	**1.08**	**1.40**
No	1			1		
BMI	0.99	0.98	1.00	1.00	0.99	1.00
Number of NCDs						
1 NCD				0.86	0.71	1.05
2 NCDs				0.94	0.76	1.15
3 NCDs				0.84	0.66	1.07
4 or more NCDs				1		

It is noteworthy that illiterate or literate individuals are less active than those with higher education levels. It was also found that those who live in the urban area are more active (PR_{nonNCD}=1.44; PR_{NCD}=1.38) as well as those who have good (PR_{nonNCD}= 2.32; PR_{NCD}=1.60) and regular (PR_{nonNCD}=1.84; RP_{NCD}=1.21) health perception. In contrast, smoking (RP_{nonNCD}=0.64; RP_{NCD}=0.69), drinking (PR_{nonNCD}=0.77; PR_{NCD}=0.77) and having paid work (PR_{nonNCD}= 0.87; PR_{NCD}=0.89) are less associated with active style in the investigated groups.

In the non-NCD group, a discrepancy between genders is observed, with male being 42% more active than females (PR = 1.42). This is also seen among those who have health insurance (PR = 1.26) and those who are not physically or mentally disabled (PR = 1.31). In contrast, in the NCD group, it is possible to identify a distinction between elderly and non-elderly people (PR = 1.22), which are more active as well as non-white people (PRwhite = 0.85) and those who have restful sleep (PR = 1.23).

In addition, the variables of informal social support and social class are related to the active lifestyle differently in the analyzed groups. The active lifestyle is associated with people with NCDs only when they have a broader social support network than those without NCDs, that is, above 6–10 people (PR_{NCD}=1.56). In contrast, active and non-NCD people are associated with active lifestyle mainly in social support networks below 6–10 people (PR_{nonNCD}=1.26).

As for social class, all strata below class A are less associated with active lifestyle. The non-NCD group showed an increasing gradient of association with the active lifestyle between the strata DE up to A. On the other hand, in the NCD group, only strata DE (PR = 0.43) and C (PR = 0.56) differs from stratum A, which is similar to stratum B.

Living with/without a spouse, having perceptions of depressive symptoms and emotional lability as well as the number of NCDs in the group with these conditions were not associated with active style nor were they able to discriminate against them.

Discussion

It is necessary to understand the biopsychosocial inequalities that are related to the active lifestyle in the Brazilian population and that may potentiate the development of chronic diseases or worsen them. It is possible to state that in Brazil, among people with and without chronic health conditions, the proportion of physically active people is similar. However, there are biopsychosocial factors associated with the active lifestyle that sometimes are shared by both groups and some other factors are exclusively shown in only one of them.

One of these factors that revealed an association with active behavior in both groups was informal social support, however, with a different influence potential in both groups. Concomitantly, the more involved in supporting people, the greater the engagement of those receiving this support, which can influence the prevention/management of NCDs. [18] In this perspective, Wang et al. 2020[19] evaluated the effect of social support on the level of physical activity, finding that the greater the support from family, friends and partners, the greater the level of physical activity and the greater the self-efficacy. The specific social support for physical activity is an important factor that helps mainly the elderly to be physically active, [20] which is the case of the NCD group in this study, which comprises a higher proportion of elderly people.

This is reflected in the gradient of social support related to active behavior, where Brazilians without NCDs are associated with the active lifestyle with less informal social support than those with NCDs. This greater need for contextual assistance for those with NCDs may be linked to social restrictions that other characteristics such as age may contribute to. Social restrictions, specific to this population, consist of access to precarious professional support during the practice of supervised physical activity and limited access to essential medicines with/without prescription. Performing physical activity without monitoring makes this healthy behavior risky for the clinical safety of people with NCDs, especially those in advanced stages.

Other biopsychosocial conditions that are related to active behavior in both groups are smoking and alcohol consumption. Smoking and drinking are less associated with active lifestyle in our study, which also contributes to the decline in quality of life and health, with a higher prevalence of chronic diseases. [21] People who smoke are more likely to present respiratory symptoms and lower levels of physical activity than people who do not smoke. [22,23] Physical exercise is a strong ally in the process of smoking cessation, because the practice of physical exercises provides positive effects in reducing withdrawal symptoms and impulsivity, thus suggesting a double effect direction and the need to encourage adherence to an active lifestyle. [24]

Similar to this situation, people who live in the urban area show higher prevalence in the practice of physical activity, when compared to the rural area, regardless of whether or not they have NCDs. Rural people inevitably have structural constraints, such as the absence of specific environments for the practice of physical activity, and psychological constraints, such as the perception that human work is enough, which can interfere in the understanding of the importance of the practice of planned physical activity as a protective health measure. This context reinforces the idea that the intensity of work can influence the practice of recreational physical activity [25].

The individual's perception of feeling healthy or sick is not only due to physical sensations, but also to the social and psychological consequences of the disease, [26] and it is also a common condition for both groups. In this study, it was observed that a perception of health as good or regular is associated with a more active lifestyle. It is a positive feedback, in which the more active a person is, the better the self-perception of one's own health and vice versa. This is an indicator of vitality and it must be measured individually and collectively in order to estimate how healthy the person and the population are. Even with NCDs, individuals with a good perception of health are able to

be more active, which may minimize their activity limitations and generate relevant social and economic impact. [27] The same occurs for those without NCDs, in this case the main idea is the prevention of these conditions.

Unlike the biopsychosocial characteristics discussed so far, the participant's sex also demonstrated influence, but only in the group without NCDs, where the sedentary pattern is more common in female individuals. Considering the Brazilian adult population, 44.8% do not reach a satisfying level of physical activity, this percentage is higher among women than men. Women experience more barriers to the practice of physical activity, which is reduced according to the increase in the education level. [28–31] This was also one of our findings, when we observed that those with higher education or graduate degrees are more active.

This inequality does not seem to be related to biological but to social issues, as there is no evidence that the anatomophysiological composition of female individuals prevents them from having physically active behavior. Furthermore, women who perceive and receive little social support related to the practice of physical exercise have a negative impact on quality of life, emphasizing that social support should be perceived as a determinant of people's health, by health services, by the community, through the several social actors, including family members, friends, neighbors, religious groups and health professionals, [32,33] which supports the statement that it is a gender issue and not biological conditioning.

Our findings indicate that age is only relevant in individuals with NCDs, and the elderly in this group are less active than adults. A practice of weekly physical activity of moderate intensity tends to decrease with age and increase with the presence of morbidities. The negative association between being elderly and active lifestyle in individuals with NCDs reported in this study is very worrying, considering that there is a great loss of physiological functions such as strength, balance and cognition that leads to the worsening of the progression stages of NCDs, [34,35] reinforced by the social stigmatization that elderly people suffer from the false assumptions of their potential fragility for physical exercise, the need for permanent rest and that their functional independence is minimal. [36,37]

On the other hand, high levels of education and income seem to be related to active behavior in both groups and to minimize the effect of age and possibly other social indicators. This reinforces the idea of public stimulus actions, as there is good evidence that the practice of physical activity is related to a lower risk of chronic diseases as well as good quality of life, self-efficacy and better cognitive performance in the elderly. [38–40]

As well as age, there is a negative association between white people and active lifestyle in the NCD group and some studies highlight that white elderly people had lower levels of commuting physical activity; and physical inactivity at work was higher in whites adults with higher education and higher income. [41] This is a paradoxical condition, as white people are more associated with better health status, but it might be explained by the interaction with the age, in which white elderly people have a higher life expectancy and, therefore, a greater chance of having NCDs.

Having private health insurance is more associated with active behavior in the non-NCD group, and people with private health insurance generally belong to a high socioeconomic level and generally have a higher level of education. However, high social status and education are commonly associated with an active lifestyle in both groups in this study. Probably, the highest proportion of elderly people in the NCDs group prevent them from having access to insurance due to the higher fees charged for this age group, which does not make the association in this group significant. Another plausible scenario is that a quick and wide access to the diversified option of health professionals in specialized health services made possible by private insurance may facilitate adherence to the physically active lifestyle, which results in higher levels of physical activity only in the group without NCDs .[31,42,43]

On the other hand, people with paid work appear to be less active in both groups. This fact can be justified by having a more active life in the work aspect, which already promotes some type of physical effort, discarding the regular practice of physical activity prescribed as a preventive measure. Thus, it is essential to understand the barriers to the practice of physical activity in workers that could contribute to the elaboration of strategies for increasing the active lifestyle and improving quality of life in health promotion programs, mainly in primary health care, [44] addressing specific skills of movement, control and self-regulation that come from the health and physical domains. [45]

The negative association between people with physical or intellectual disabilities and active lifestyle was found in the non-NCD group. A study [46] showed that people with disabilities who have completed higher education or graduate school and were moderately active in childhood are more likely to be active than other adults with visual impairment. Another result shows significant increase in sedentary lifestyle, overweight and obesity in this population with disabilities, further increasing the chances of developing NCDs.[47]

In the NCD group, physical or intellectual disabilities can have their effects mixed with chronic morbidities, not being an inequality factor, mainly because the number of NCDs was not associated with active style. However, several barriers stand out, such as problems with the sidewalks, lack of appropriate facilities/spaces, lack of support policies for public entities, need for a guide, lack of provision of activities by specialized institutions and lack of security conditions of the facilities to avoid accidents. More studies are needed in this population regarding the levels of physical activity.

Studies show that higher levels of physical activity are related to greater efficiency and quality of sleep, as well as low levels of physical activity are associated with worse quality of sleep. [48,49] However, restful sleep was positively associated with an active lifestyle only in the NCD group. Sleep plays a fundamental role in the physiological recovery and people with NCDs suffer extensively with symptoms of insomnia and excessive daytime sleepiness mediated by medications, pain and physiological changes in the sleep-wake cycle. [50]

Despite inferences of great impact shown in this study, there are some limitations that must be highlighted. The first one is due to the self-reported characteristic of NCDs, however it is already known in the literature that this information is reliable. The second limitation is related to the cross-sectional design, that makes it difficult to establish causality for temporally uncertain characteristics. Finally, the limitation of not identifying the intensity of physical activity between the groups, not knowing whether there is a distinction between the moderate or vigorous level of exercise, even though knowing that both intensities generate health benefits.

Conclusion

It is evident that people with and without NCDs in Brazil have similar active behavior, however, the biological and psychosocial factors are unequally associated with this style in the analyzed groups. Thus, therapeutic or preventive proposals as well as public policies for health promotion must observe these characteristics when developing their guidelines and actions.

Treating these subpopulations equally may generate inequities for the active style and inefficacy of results, especially in individuals with NCDs, who tend to be more affected in the presence of social injustices than those without NCDs. Qualified equitable approaches focusing on smoking and drinking cessation, on individuals from rural areas, low social strata and low education levels are essential for health promotion.

References

1. Piercy KL, Troiano RP, Ballard RM, et al. The Physical Activity Guidelines for Americans. JAMA. 2018; 320(19):2020. doi:10.1001/jama.2018.14854
2. Malta DC, Stopa SR, Szwarcwald CL, Gomes NL, Silva Júnior JB, Reis AAC dos. A vigilância e o monitoramento das principais doenças crônicas não transmissíveis no Brasil - Pesquisa Nacional de Saúde, 2013. Rev Bras Epidemiol. 2015;18 (suppl 2):3-16. doi:10.1590/1980-5497201500060002
3. Brazil, Ministry of Health. Plano Nacional de Saúde. 2020.
4. Brazil, Ministry of Health. Relatório do III fórum de monitoramento do plano de ações estraté gicas para o enfrentamento das doenças crônicas não transmissíveis no Brasil. 2018.
5. Malta DC, Andrade SSC de A, Oliveira TP, Moura L de, Prado RR do, Souza M de FM de. Probabilidade de morte prematura por doenças crônicas não transmissíveis, Brasil e regiões, projeções para 2025. Rev Bras Epidemiol. 2019;22:e190030. doi:10.1590/1980-549720190030
6. ORGANIZAÇÃO MUNDIAL DA SAÚDE. Atividade Física - Folha Informativa N° 385 - fevereiro de 2014.
7. Moreira MM, Ikegami EM, Mesquita IMR, et al. Impacto da inatividade física nos custos de internações hospitalares para doenças crônicas no Sistema Único de Saúde. Arquivos de Ciências do Esporte. 2017; 5(1).
8. Francisco PMSB, Segri NJ, Borim FSA, Malta DC. Prevalence of concomitant hypertension and diabetes in Brazilian older adults: individual and contextual inequalities. Ciência & Saúde Coletiva. 2018; 23(11):3829-3840. DOI: 10.1590/1413-812320182311.29662016.
9. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants. Lancet Glob Health. 2018; 6(10):e1077-e1086. DOI:10.1016/S2214-109X(18)30357-7
10. Carrapato P, Correia P, Garcia B. Determinante da saúde no Brasil: a procura da equidade na saúde. Saúde E Soc. 2017; 26(3):676-689. DOI:10.1590/s0104-12902017170304
11. Garbois JA, Sodré F, Dalbello-Araujo M. Da noção de determinação social à de determinantes sociais da saúde. Saúde em Debate. 2017; 41(112):63-76. DOI:10.1590/0103-1104201711206
12. Meyer OL, Castro-Schilo L, Aguilar-Gaxiola S. Determinants of Mental Health and Self-Rated Health: A Model of Socioeconomic Status, Neighborhood Safety, and Physical Activity. Am J Public Health. 2014; 104(9):1734-1741. DOI:10.2105/AJPH.2014.302003
13. Ribeiro MCS de A, Barata RB. Saúde: vulnerabilidade social, vizinhança e atividade física. Cad Metrópole. 2016; 18(36):401-420. DOI:10.1590/2236-9996.2016-3605
14. Barros MB de A, Francisco PMSB, Lima MG, César CLG. Social inequalities in health among the elderly. Cad Saúde Pública. 2011;27(suppl 2):s198-s208. DOI:10.1590/S0102-311X2011001400008
15. Ullits LR, Ejlskov L, Mortensen RN, et al. Socioeconomic inequality and mortality - a regional Danish cohort study. BMC Public Health. 2015;15(1):490. DOI:10.1186/s12889-015-1813-3
16. Ng JH, Bierman AS, Elliott MN, Wilson RL, Xia C, Scholle SH. Beyond Black and White: Race/Ethnicity and Health Status Among Older Adults. Am J Manag Care 2014 Mar;20(3):239-48.
17. Loch MR, Lemos EC de, Siqueira FS, Facchini LA. A revisão da Política Nacional de Atenção Básica e a Promoção da Atividade Física. Rev Bras Atividade Física Saúde. 2017;22(4):315-318. DOI:10.12820/rbafs.v.22n4p315-318

18. Lopes JM, Guedes MBO. Fisioterapia na atenção primária: manual de prática profissional baseado em evidência - 1. ed. - Rio de Janeiro: Atheneu, 2019.
19. Wang C, Pan R, Wan X, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. Int J Environ Res Public Health. 2020;17(5):1729. DOI:10.3390/ijerph17051729
20. Lindsay Smith G, Banting L, Eime R, O'Sullivan G, van Uffelen JGZ. The association between social support and physical activity in older adults: a systematic review. Int J Behav Nutr Phys Act. 2017; 14(1):56. DOI:10.1186/s12966-017-0509-8
21. Anishchenko AP, Arkhangel'skaya AN, Pustovalov DA, Rogoznaya EV, Urakov AL, Gurevich KG. [The association between physical inactivity and other behavioural risk factors of the development of chronic non-communicative diseases among the students]. Vopr Kurortol Fizioter Lech Fiz Kult. 2017; 94(1):15-20. DOI:10.17116/kurort201794115-20
22. Efendi V, Özalevli S, Naz İ, Kılınç O. The effects of smoking on body composition, pulmonary function, physical activity and health-related quality of life among healthy women. Tuberk Toraks, 2018 Jun; 66(2):101-108. DOI: 10.5578/tt.50724.
23. Purani H, Friedrichsen S, Allen AM. Sleep quality in cigarette smokers: Associations with smoking-related outcomes and exercise. Addict Behav. 2019; (90):71-76. DOI:10.1016/j.addbeh.2018.10.023
24. Tosun NL, Allen SS, Eberly LE, et al. Association of exercise with smoking-related symptomatology, smoking behavior and impulsivity in men and women. Drug Alcohol Depend. 2018;(192):29-37. DOI:10.1016/j.drugalcdep.2018.07.022
25. Pinto LLT, Rocha SV, Viana HPS, Rodrigues WKM, Vasconcelos LRC. Nível de atividade física habitual e transtornos mentais comuns entre idosos residentes em áreas rurais. Rev Bras Geriatr E Gerontol. 2014; 17(4):819-828. doi:10.1590/1809-9823.2014.13204
26. Pavão ALB, Werneck GL, Campos MR. Autoavaliação do estado de saúde e a associação com fatores sociodemográficos, hábitos de vida e morbidade na população: um inquérito nacional. Cad Saúde Pública. 2013; 29(4):723-734. DOI:10.1590/S0102-311X2013000400010
27. Lindemann IL, Reis NR, Mintem GC, Mendoza-Sassi RA. Autopercepção da saúde entre adultos e idosos usuários da Atenção Básica de Saúde. Ciênc Saúde Coletiva. 2019; 24(1):45-52. DOI:10.1590/1413-81232018241.34932016
28. Brazil, Ministry of Health. Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico (VIGITEL). 2019.
29. Lima DF, Lima LA, Júnior OM, et al. Associação da atividade física de lazer e do deslocamento ocupacional com a caminhada e o ciclismo: um estudo transversal com brasileiros adultos. Rev Atenção À Saúde. 2020; 17(62). DOI:10.13037/ras.vol17n62.5923.
30. Segri NJ, Barros MB de A. Desigualdades sociodemográficas nos fatores de risco e proteção para doenças crônicas não transmissíveis: inquérito telefônico em Campinas, São Paulo. Epidemiol E Serviços Saúde. 2015; 24(1): 7-18. DOI:10.5123/S1679-49742015000100002.
31. Silva CR de M, Bezerra J, Soares FC, Mota J, Barros MVG de, Tassitano RM. Percepção de barreiras e facilitadores dos usuários para participação em programas de promoção da atividade física. Cad Saúde Pública. 2020; 36(4):e00081019. DOI:10.1590/0102-311x00081019.
32. Agostinho BK, Silveira LM, Matioli MR, et al. Apoio social, qualidade de vida e a percepção de mulheres praticantes de treinamento físico. Res Soc Dev. 2020; 9(1):03911520. DOI:10.33448/rsd-v9i1.1520.

33. Guedes MBOG, Lima KC, Caldas CP, Veras RP. Apoio social e o cuidado integral à saúde do idoso. Physis Rev Saúde Coletiva. 2017; 27(4):1185-1204. DOI:10.1590/s0103-73312017000400017.
34. Leirós-Rodríguez R, Soto-Rodríguez A, Pérez-Ribao I, García-Soidán JL. Comparisons of the Health Benefits of Strength Training, Aqua-Fitness, and Aerobic Exercise for the Elderly. Rehabil Res Pract. 2018. DOI:10.1155/2018/5230971.
35. Scianni AA, Faria GS e, Silva JS da, Benfica P do A, Faria CDC de M. Efeitos do exercício físico no sistema nervoso do indivíduo idoso e suas consequências funcionais. Rev Bras Ciênc Esporte. 2019; 41(1):81-95. DOI:10.1016/j.rbce.2018.03.026.
36. Virtuoso-Júnior JS, Tribess S, Smith Menezes A, Meneguci J, Sasaki JE. Fatores associados à incapacidade funcional em idosos brasileiros. Rev Andal Med Deporte. Published online September 2016:S1888754616300867. DOI:10.1016/j.ramd.2016.05.003.
37. Almeida Lima C, Leite Rangel R, Brito dos Santos L, et al. Dependência funcional e risco de quedas em idosos no ambiente domiciliar e fatores associados. Rev Ciênc e Desenvolv. 2019; 12(3):687-704. DOI:10.11602/1984-4271.2019.12.3.13.
38. Almeida BL, Evangelista CB. Quality of life of elderly people who practice physical activities. Revista on line de pesquisa: cuidado é fundamental. 2020; (12): 432-4365. DOI: 10.9789/2175-5361.rpcfo.v12.8451
39. Araujo Assunção JL, Chariglione IPFS. Envelhecimento Cognitivo, Autoeficácia e Atividade Física: Uma Revisão Sistemática. Rev Psicol IMED. 2020; 12(1):116. DOI:10.18256/2175-5027.2020.v12i1.3120.
40. Marques A, Santos T, Martins J, Matos MGD, Valeiro MG. The association between physical activity and chronic diseases in European adults. Eur J Sport Sci. 2018;18(1):140-149. DOI:10.1080/17461391.2017.1400109.
41. Zanchi M, Gonçalves CV, Cesar JA, Dumith S de C. Concordância entre informações do Cartão da Gestante e do recordatório materno entre puérperas de uma cidade brasileira de médio porte. Cad Saúde Pública. 2013; 29(5):1019-1028. DOI:10.1590/S0102-311X2013000500019.
42. Forechi L, Mill JG, Griep RH, Santos I, Pitanga F, Molina M del CB. Adherence to physical activity in adults with chronic diseases: ELSA-Brasil. Rev Saúde Pública. 2018;52:31. DOI:10.11606/S1518-8787.2018052000215.
43. Rivera-Torres S, Fahey TD, Rivera MA. Adherence to Exercise Programs in Older Adults: Informative Report. Gerontol Geriatr Med. 2019; 5:233372141882360. DOI:10.1177/2333721418823604.
44. Ferreira JS, Diettrich SHC, Pedro DA. Influência da prática de atividade física sobre a qualidade de vida de usuários do SUS. Saúde Em Debate. 2015; 39(106):792-801. DOI:10.1590/0103-1104201510600030019.
45. Mitsutake S, Shibata A, Ishii K, et al. Clustering of Domain-Specific Sedentary Behaviors and Their Association With Physical Function Among Community-Dwelling Older Adults. J Phys Act Health. 2020; 17(7):709-714. DOI:10.1123/jpah.2019-0219.
46. Lima Scherer R, Colussi Karasiak F, Ferreti Borgatto A. Fatores associados à atividade física na deficiência visual. Educ Física Cienc. 2018; 20(4):e064. DOI:10.24215/23152561e064.
47. Marmeleira JFF, Fernandes JMG de A, Ribeiro NC, Teixeira J de A, Gutierres Filho PJB. Barreiras para a prática de atividade física em pessoas com deficiência visual. Rev Bras Ciênc Esporte. 2018;40(2):197-204. DOI:10.1016/j.rbce.2017.12.001.
48. Silva MR da, Ferretti F, Pinto S da S, Tombini Filho OF. Depressive symptoms in the elderly and its relationship with chronic pain, chronic diseases, sleep quality and physical activity level. Braz J Pain. 2018;1(4). DOI:10.5935/2595-0118.20180056.

49. Gubelmann C, Heinzer R, Haba-Rubio J, Vollenweider P, Marques-Vidal P. Physical activity is associated with higher sleep efficiency in the general population: the CoLaus study. Sleep. 2018; 41(7). DOI:10.1093/sleep/zsy070.
50. Lopes JM, Roncalli, AG. Self-percepted sleep function in Brazilian elderly people: analysis of a national survey. Rev bras epidemiol 2020; 23: e2000x [Internet].