

Counseling on physical activity before and during the Covid-19 pandemic among users of the Brazilian community health promotion program

Aconselhamento sobre atividade física antes e durante a pandemia de Covid-19 em usuários do Programa Academia da Saúde do Brasil

Asesoramiento sobre actividad física antes y durante la pandemia de Covid-19 para usuarios del Programa Academia da Saúde do Brasil

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Abstract The aim is to investigate the association between physical activity counseling before and during the Covid-19 pandemic and sociodemographic variables, according to body mass index (BMI) and participation time in the program. A cross-sectional study was conducted with 979 users aged 20 years or older. Before the pandemic, being ≥ 60 years of age was associated with counseling in users with up to one year of participation in the program. During the pandemic, being ≥ 60 years of age and having higher education were aspects associated with counseling among participants with normal weight. Furthermore, being separated/widowed among those classified as overweight/obesity, and being female and having higher education among those with up to one year in the program were aspects associated with counseling during the pandemic. Before the pandemic, counseling was associated with age ≥ 60 years in participants with up to one year in the program. During the pandemic, age ≥ 60 years and a higher number of years of education were associated with physical activity counseling among those with normal weight. Additionally, being separated/widowed was associated with overweight/obesity. During the pandemic, being female and higher educational attainment were associated with physical activity counseling.

Keywords Health promotion, Counseling, Motor activity

Resumo O objetivo é investigar a associação entre aconselhamento sobre atividade física antes e durante a pandemia de Covid-19 e variáveis sociodemográficas, de acordo com o Índice de Massa Corporal (IMC) e tempo de programa. Estudo transversal com 979 usuários com idade de 20 anos ou mais. Antes da pandemia, ter idade ≥ 60 anos foi associado ao aconselhamento nos usuários com até um ano de Programa. Durante a pandemia, ter idade ≥ 60 anos e maior escolaridade foram aspectos associados ao aconselhamento entre os participantes com peso normal. Ser separado/viúvo entre aqueles classificados com sobrepeso/obesidade e ser do sexo feminino e ter maior escolaridade entre aqueles com até um ano no Programa foram aspectos associados ao aconselhamento durante a pandemia. Antes da pandemia, o aconselhamento esteve associado à idade ≥ 60 anos em participantes com até um ano no programa. Durante a pandemia, idade ≥ 60 anos e maior número de anos de estudo foram associados ao aconselhamento entre aqueles com peso normal. Ainda, ser separado/viúvo estava associado ao sobrepeso/obesidade. Durante a pandemia, ser do sexo feminino e maior escolaridade foram associados ao aconselhamento sobre atividade física.

Palavras-chave Promoção da saúde, Aconselhamento, Atividade motora

Resumen El objetivo es investigar la asociación entre consejos sobre actividad física antes y durante la pandemia Covid-19 y variables sociodemográficas, según índice de masa corporal (IMC) y tiempo de programa. Estudio transversal con 979 usuarios de 20 años o más. Antes de la pandemia, tener ≥ 60 años se asociaba con consejería para usuarios con hasta un año de permanencia en el Programa. Durante la pandemia, tener ≥ 60 años y tener educación superior fueron aspectos asociados con el asesoramiento entre los participantes con peso normal. Ser separado/viudo entre los clasificados con sobrepeso/obesidad y ser mujer y tener educación superior entre los que tienen hasta un año en el Programa fueron aspectos asociados a la consejería durante la pandemia. Antes de la pandemia, la consejería se asociaba con la edad ≥ 60 años en participantes con hasta un año en el programa. Durante la pandemia, la edad ≥ 60 años y más años de educación se asociaron con el asesoramiento entre las personas con peso normal. Además, estar separado/viudo se asoció con sobrepeso/obesidad. Durante la pandemia, ser mujer y tener estudios superiores se asociaron con consejos sobre actividad física.

Palabras clave Promoción de la salud, Asesoramiento, Actividad motora

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Introduction

In addition to restrictions on activities of daily living, including work and active commuting^{1,3}, the Covid-19 pandemic had a direct impact on the leisure time activities routine⁴, a period during which people often engage in physical activity. Consequently, the absence of specific drugs or vaccines for combating the virus and related health risks led to control and prevention measures by health authorities (e.g., restrictions on public parks, community programs, social isolation)^{5,6}. Thus, it is possible that the closure of public spaces or the imposition of restrictions on the use of widely recognized private places for physical activity, such as gyms and residential leisure areas, may have exacerbated levels of physical inactivity during the Covid-19 pandemic^{7,9}. However, when analyzing the consequences of these restrictive measures, it is necessary to consider regional disparities, as differences between the regions of Brazil may have influenced the population's response to the imposed restrictions^{10,11}. Considering the period before the pandemic, the absence of physical activity was already recognized as a problem directly associated with various health risks¹². However, as evidence confirmed the relationship between physical inactivity and non-communicable chronic diseases¹², the investigation of this interrelation becomes even more relevant in light of the worsening clinical conditions associated with Covid-19¹³. Moreover, adverse outcomes related to physical inactivity and mental health during the pandemic, such as loneliness, sadness, and anxiety, deserve special attention¹⁴. In this scenario, these interactions can represent an additional concern for health, intensified by an already challenging context related to physical inactivity.

Besides being recommended for individuals without a diagnosis of disease, during the Covid-19 pandemic, it was observed that among those with non-communicable chronic diseases, higher levels of physical activity were associated with less severe Covid-19 outcomes¹³, emphasizing the need to encourage people to increase their physical activity levels. Additionally, it is known that excess body weight is a risk factor for non-communicable chronic diseases¹⁵, and notably, during the pandemic, individuals with overweight/obesity may have faced additional challenges in preserving their health. This is because excess weight leads to substan-

tial complications in Covid-19 patients, including changes in respiratory dynamics, such as increased ventilation demand and respiratory effort, which translates into an increased risk of more severe respiratory infections^{15,16}. In this context, strategies to promote physical activity, such as counseling, could have beneficial effects on the prevention or maintenance of the health of individuals with chronic conditions before the pandemic, as well as assist in mitigating the severity of these individuals in the pandemic context.

Conceptually, counseling can be defined as structured guidance aimed at promoting physical activity¹⁷. Studies have reported that sex (females compared to males)^{18,19}, higher education level^{18,20}, older age group^{19,21}, and participation in the community physical activity program²² were directly associated with counseling on physical activity before the Covid-19 pandemic. However, it should be noted that information regarding specific groups of adults/older adults most likely to receive counseling on physical activity during the Covid-19 pandemic is not known²³.

In order to promote health promotion actions in the face of modifiable risk factors, such as physical inactivity, a community health promotion program, entitled "Academia da Saúde" (*in English: Health Academy*), was implemented in 2011 through the National Health Promotion Policy around Brazil²⁴. Due to the extensive reach of the Program²⁵ it was expected that, before the pandemic, participants could benefit significantly, including establishing a connection between professionals and users, enhancing individual knowledge about healthy lifestyles, and becoming familiar with the resources and services offered by the program, which could directly impact increased counseling. Additionally, it is possible that support for Program users continued, encouraging physical activity as a coping strategy for the challenges posed by the pandemic. However, considering that before the pandemic, Program users had regular access to activities at the center, and due to the restrictions of the pandemic context, the availability of these activities was compromised, leading to the suspension of actions²⁶, it is believed that the prolonged interruption of these may have contributed to changes in the prevalence of advice on physical activity during the Covid-19 pandemic.

For the present study, the following hypotheses were established: 1) the presence/absence

of physical activity counseling differed depending on the period (before/during the Covid-19 pandemic); 2) the presence/absence of physical activity counseling before and during the Covid-19 pandemic varied according to weight status; 3) the duration of participation in the Program had a direct impact on the presence of physical activity counseling.

Thus, this study aimed to investigate the association between physical activity counseling before and during the Covid-19 pandemic and sociodemographic variables, according to body mass index and participation time in the program, among users of a national community health promotion program in Brazil.

Materials and methods

Study Design, Ethical Considerations, and Participants

The present cross-sectional study utilized data from the population-based study entitled “MOTIVA-SUS: a cross-sectional epidemiological study on motivational determinants for physical activity among users of the ‘Academia da Saúde’ Program.” The project was approved by the Human Research Ethics Committee of the Federal University of Santa Catarina, Brazil (protocol no. 5.040.451). Data collection was conducted through telephone interviews from February 2022 to June 2022. During this period, the country experienced a significant increase in Covid-19 cases (February 2022), attributed to the introduction of the Omicron variant at the end of 2021 and the resurgence of the Delta variant 27. By June 2022, this scenario had changed, with a decline in Covid-19 cases and, at the same time, regional challenges in achieving vaccination coverage 28.

The informed consent form was offered to all individuals prior to the interviews, and acceptance or refusal to participate in the research was given verbally over the phone. Telephone interviews, rather than in-person interviews, were conducted due to the Covid-19 pandemic.

The study’s target population consisted of individuals aged 18 years or older of both sexes, who were users of the “Academia da Saúde” Program from the five geographic regions of Brazilian territory (Mid-West, Northeast, North, Southeast, and South).

The sampling process was conducted considering conglomerates. For sampling purposes, the municipal Human Development Index

(HDI-m) of all municipalities was measured, classifying them into low HDI-m (<0.550), medium ($0.550-0.699$), and high (>0.699) HDI-m. From this classification, the social and economic development of each of the Brazilian municipalities with built poles of the “Academia da Saúde” Program was identified. With this information, it was possible to create 15 sample strata. However, one of the created strata (low HDI-m/South region of the country) did not present a municipality included with poles of the “Academia da Saúde” Program. Thus, 14 strata were established for final sampling. According to the HDI-m, three strata were created for the North, Northeast, Mid-West, and Southeast regions, and two strata in the South region of the country.

The cluster sampling process was developed in two stages. In the first stage, five municipalities were randomly selected within each stratum. The selected municipalities were contacted through the Brazilian Ministry of Health and municipal health secretariats, and invited to participate in the research. They were asked to provide the number of registered users in the Program. In the second stage of the cluster sampling process, each user was randomly selected within the municipality that agreed to participate in the research. The selected users were contacted by telephone and invited to participate in the study. If a contacted user declined to participate, another user was randomly selected from the same stratum to replace them.

Based on the research budget, 86 interviews per stratum were estimated to ensure that all strata had interviewed users. According to these estimates, the sample size was 1,204 users from the “Academia da Saúde” Program in Brazil. In fact, 1,212 users were interviewed, as eight participants who had initially declined the invitation returned the call to the research team expressing interest in participating and were included in the final sample.

Based on the number of 1,212 users who participated in the research and estimating the post hoc statistical power for association studies with $\alpha = 0.05$, $\beta = 0.20$, and a similar sample proportion between two groups (50%), it is possible to detect differences in bivariate analysis for Odds Ratio (OR) ≥ 1.18 for risk factors and OR ≤ 0.88 for protective factors. Among these users, 979 (80.7% of the original sample) provided complete information on the variables investigated in the present study. Since the present study used data from a smaller sample than

initially estimated, statistical power calculations were conducted. The available statistical power for testing the associations of interest in this study can be observed in Supplementary Table 1, Supplementary Table 2, Supplementary Table 3, Supplementary Table 4, and Supplementary Table 5. In general, most of the tested associations showed insufficient statistical power ($<80.0\%$)²⁹, indicating that some truly significant results may not have been identified due to the limited sample size.

Physical activity counseling

Users of the Program were asked whether *“Before the Covid-19 pandemic, in a consultation at the Health Center, any professional (Doctor, Nurse, Nutritionist, Physical Education professional...) told you that you should do physical activity to improve your health?”* and *“During the last 12 months, i.e., during the pandemic, any health professional (doctor, nurse, nutritionist, physical education professional...) told you that you should do physical activity to improve your health?”*. In both questions, the response options were “no” (absence of counseling) and “yes” (presence of counseling). The questions used in this study were widely used in research on counseling^{18,19,30}; few studies have evaluated its prevalence in Primary Health Care in Latin American countries. This study aimed to describe the prevalence and analyze the associated factors of PA counseling in adults in Primary Health Care in Brazil. This is a cross-sectional study with a representative sample of 779 adults (70% women).

Exposure variables

Information on sex (male/female), age range (adults - 20 to 59 years; older adults - 60 years or older), years of education (0 to 8 years, 9 to 11 years, 12 years of complete education), and marital status (single, married/common law, separated/divorced/widowed) were obtained. The exposure variables were selected and categorized according to the literature that indicates greater counseling among females^{17,19}, among those who are older^{19,21}, with higher education^{18,20}, and among those who are married or in a stable union²¹.

Stratification variables/Adjustment variables

Body mass index (BMI) and time of participation in the Program were used as adjustment variables and, in another stage of statistical modeling, these variables (BMI and time of participation in the Program) were used as stratification due to their possible relationship with the receipt of counseling on physical activity^{17,18,20,21}.

Anthropometric indicators (body mass and height) were measured through self-reported questions “Do you know your weight (even if it is an approximate value)?” and “What is your height?”. Body mass was then self-reported in kilograms, and height in centimeters. The participants' BMI was then determined using the following formula: $BMI = \text{body mass}/\text{height}^2$ (kg/m^2), and the value generated by BMI (continuous variable) was categorized as “normal weight” ($<25.0 \text{ kg}/\text{m}^2$) or “overweight/obese” ($\geq 25.0 \text{ kg}/\text{m}^2$)³¹. According to literature recommendations, self-reported measures can be used in identifying overweight and obesity in epidemiological studies³².

Information regarding the duration of participation in the program was assessed through the following question: “In total, adding the period before the pandemic and the current one, for how long have you been participating in the Program?” In this question, there were no predefined response options, and participants verbally provided their participation duration, which was recorded in years and months (continuous variable) and later dichotomized into participation duration <1 year or ≥ 1 year.

Data Analysis

Descriptive and inferential statistics were adopted to describe the analyzed information. To estimate possible differences between groups according to physical activity counseling, the Chi-square test of heterogeneity and Fisher's exact test were used. Binary logistic regression with Odds ratio (OR) estimation and 95% confidence interval (CI95%) was used to analyze the association between the dependent variables (physical activity counseling before and during the Covid-19 pandemic) and independent variables (sex, age, education level, and marital status). Considering the possible relationship between BMI and participation time in the Program with receiving physical activity coun-

seling^{17,18,20–22}, the analyses were conducted and stratified according to these variables before and during the pandemic. In the adjusted analysis, the model used to test the associations included the dependent variable and the sociodemographic variables under investigation. In these analyses, the other sociodemographic variables, BMI, and program participation time were included as controls. Additionally, the association between physical activity counseling before and during the pandemic and sociodemographic variables was investigated, with results stratified by BMI and program time. When stratified by BMI or program time, the adjusted models considered sociodemographic variables and BMI (analysis stratified by program time) or program time (analysis stratified by BMI) as controls. The sociodemographic and control variables were introduced into the adjusted analyses, regardless of the statistical significance level in the association with the outcomes.

The analyses were performed using Stata software (Stata Corp LP, College Station, TX, USA), version 16.0, considering sample weights and survey design, with a significance level of 5%.

Results

A total of 979 individuals (906 females) with complete information for all investigated outcomes participated in the study (80.7% of the original sample). General information about the participants and the investigated variables, according to physical activity counseling before and during the Covid-19 pandemic, is described in Supplementary Table 6. Physical activity counseling was identified in 86.60% (n=848) of participants before the Covid-19 pandemic and in 47.70% (n=467) of participants during the Covid-19 pandemic. Among participants who received counseling before the Covid-19 pandemic, 93.15% were female (n=790), aged 20 to 59 years (n=612, 72.45%), with nine to 11 years of education (n=396, 46.78%), and married or in a stable union (n=537, 63.84%). Among participants who received counseling during the Covid-19 pandemic, 94.03% were female (n=440), aged 20 to 59 years (n=336, 72.02%), had nine to 11 years of education (n=219, 47.71%), and were married or in a stable union (n=306, 65.75%).

General information about the participants and the investigated variables in relation to physical activity counseling according to BMI (Supplementary Table 7), or information about the participants according to program duration (Supplementary Table 8) considering physical activity counseling before (Supplementary Table 9 and Supplementary Table 10 and Supplementary Table 11) and during (Supplementary Table 9 and Supplementary Table 12 and Supplementary Table 13) the Covid-19 pandemic can be accessed in supplementary tables.

There was no association between physical activity counseling and sociodemographic variables before and during the Covid-19 pandemic (Table 1). Therefore, associations were tested by stratifying the sample according to BMI (normal weight and overweight/obesity). For the analysis before the pandemic, no association was observed between the tested variables (Table 2). For the “during the pandemic” moment (Table 3), it was observed that, for the “normal weight” group, greater physical activity counseling was associated with adults aged 60 or older (OR: 1.68; 95% CI: 1.05-2.69) and with more years of education (12 years or more) (OR: 1.26; 95% CI: 1.09-1.47); for the “overweight/obesity” group, greater physical activity counseling was associated with being separated/widowed (OR: 1.23; 95% CI: 1.09-1.38).

Regarding the analysis stratified by the program time participation (<1 year; >1 year), it was observed that among individuals with up to one year of participation, being 60 years old or older (OR: 2.01; 95% CI: 1.12-3.61) was an aspect associated with physical activity counseling before the Covid-19 pandemic (Table 4). In the analysis related to counseling during the pandemic, adjusted results showed that females (OR: 1.74; 95% CI: 1.43-2.11) and individuals with a higher number of years of education (OR: 1.63; 95% CI: 1.09-2.44) were more counseled about physical activity than their peers (Table 5).

Discussion

The present study had three main findings: 1) there was an association between physical activity counseling and sociodemographic variables before and during the Covid-19 pandemic, only after stratification by BMI and time participation in the program; 2) before the pandemic, being 60 years of age or older was associated with physical activity counseling in users with

Table 1. Crude and adjusted binary logistic regression analysis for the association between counseling on physical activity before and during the Covid-19 pandemic and sociodemographic variables in participants of the Academia da Saúde Program, Brazil – 2022 (n=979).

Variables	Crude analysis				Adjusted analysis					
	Presence of counseling before the pandemic		Presence of counseling during the pandemic		Presence of counseling before the pandemic		Presence of counseling during the pandemic		Presence of counseling during the pandemic	
	n (%)	OR % (95%CI)	n (%)	OR % (95%CI)	OR % (95%CI)	OR % (95%CI)	OR % (95%CI)	OR % (95%CI)	OR % (95%CI)	OR % (95%CI)
Sex^a										
Male	58 (6.84)	1	27 (5.96)	1		1		1		
Female	790 (93.15)	1.16 (0.43-3.07)	440 (94.03)	1.35 (0.57-3.22)	1.18 (0.44-3.17)	1.42 (0.63-3.17)				
Age^b										
20-59 years	612 (42.45)	1	336 (72.02)	1		1		1		
≥60 years	236 (27.54)	1.09 (0.69-1.71)	131 (27.97)	1.06 (0.65-1.73)	1.12 (0.83-1.50)	1.18 (0.75-1.85)				
Years of education^c										
0-8 years	317 (37.26)	1	168 (35.52)	1		1		1		
9-11 years	396 (46.78)	1.09 (0.57-2.09)	219 (47.71)	1.16 (0.70-1.91)	1.13 (0.63-2.03)	1.21 (0.83-1.76)				
12 years or more	135 (15.94)	0.61 (0.33-1.14)	80 (16.75)	1.05 (0.78-1.40)	0.66 (0.36-1.21)	1.11 (0.89-1.39)				
Marital Status^d										
Single	161 (18.80)	1	80 (17.66)	1		1		1		
Married	537 (63.84)	1.11 (0.60-2.02)	306 (65.75)	1.22 (0.88-1.69)	1.08 (0.58-2.00)	1.26 (0.95-1.68)				
Separated/ Widowed	150 (17.34)	0.83 (0.39-1.77)	81 (16.57)	0.98 (0.84-1.14)	0.79 (0.40-1.57)	0.95 (0.79-1.15)				

≥: greater or equal; CI: Confidence interval; OR: Odds ratio.

a: Results adjusted for age, years of education, marital status, body mass index and time of participation in the program;

b: Results adjusted for sex, years of education, marital status, body mass index and time of participation in the program;

c: Results adjusted for sex, age, marital status, body mass index and time of participation in the program;

d: Results adjusted for sex, age, years of education, body mass index and time of participation in the program.

up to one year in the Program; 3) during the pandemic, being 60 years of age or older and having a higher number of years of education were aspects associated with physical activity counseling among participants with normal weight. Furthermore, being separated/widowed among those classified as overweight/obesity; and being female; and having a higher number of years of education among those with up to one year in the Program were aspects associated with physical activity counseling during the pandemic.

It is speculated that the individual relationship that BMI has with both physical activity counseling (e.g. compared to those with normal weight status, individuals with overweight/obesity were more likely to receive physical activity counseling) 18,30,33, as well as with

sociodemographic factors (e.g. higher purchasing power and higher age regardless of sex were described in the literature as aspects directly associated with higher weight status)³⁴, could justify the relevant role played by BMI in the interrelation between physical activity counseling and sociodemographic factors.

Regarding the association between physical activity counseling and advanced age (≥60 years), since changes caused by biological aging are part of an inherent human process^{35,37}, it is possible that healthcare professionals perceive physical activity as a means of healthy aging³⁸. This perception may be because Primary Health Care, specifically in the context of the Health Academy Program, aims to promote health and prevent many conditions associated with aging^{24,39}. Additionally, during the pan-

Table 2. Crude and adjusted logistic regression analysis for the association between counseling on physical activity before the Covid-19 pandemic and sociodemographic variables, according to body mass index, in participants of the Academia da Saúde Program, Brazil – 2022 (n=979).

Variables	n (%)	Crude analysis				Adjusted analysis				
		Normal weight		n (%)	Overweight/ Obese		Normal weight		Overweight/ Obese	
		OR	% (95%CI)		OR	% (95%CI)	OR	% (95%CI)	OR	% (95%CI)
Sex^a										
Male	15 (7.20)	1		43 (6.72)	1		1		1	
Female	198 (92.79)	1.10	(0.27-4.43)	592 (93.27)	1.18	(0.16-8.49)	0.95	(0.27-3.26)	1.22	(0.16-9.09)
Age^b										
20-59 years	141 (65.81)	1		471 (74.58)	1		1		1	
≥60 years	72 (34.18)	1.03	(0.33-3.16)	164 (25.41)	1.23	(0.73-2.08)	1.06	(0.57-1.97)	1.18	(0.89-1.57)
Years of education ^c										
0-8 years	74 (34.99)	1		243 (37.99)	1		1		1	
9-11 years	94 (44.57)	1.09	(0.42-2.87)	302 (47.49)	1.09	(0.56-2.11)	1.28	(0.56-2.95)	1.19	(0.61-2.29)
12 years or more	45 (20.43)	0.71	(0.23-2.17)	90 (14.50)	0.60	(0.25-1.43)	0.72	(0.33-1.58)	0.63	(0.28-1.43)
Marital Status^d										
Single	37 (16.20)	1		124 (19.64)	1		1		1	
Married	135 (65.28)	1.40	(0.47-4.12)	402 (63.37)	1.02	(0.53-1.97)	1.29	(0.55-3.05)	1.02	(0.53-1.95)
Separated/ Widowed	41 (18.50)	0.60	(0.09-3.91)	109 (16.97)	1.16	(0.72-1.87)	0.57	(0.11-2.75)	1.06	(0.70-1.60)

≥: greater or equal; CI: Confidence interval; OR: Odds ratio.

a: Results adjusted for age, years of education, marital status, length of participation in the program;

b: Results adjusted for sex, years of education, marital status, time of participation in the program;

c: Results adjusted for sex, age, marital status, length of participation in the program;

d: Results adjusted for sex, age, years of education, length of participation in the program.

demic, there was speculation about the great concern regarding the negative impact on the physical and mental health of the older adults, since there was a limitation on social participation and family activities⁴⁰, justifying the use of counseling as a strategy to increase or maintain levels of physical activity and act as a protective factor for various health conditions.

It is hypothesized that interrelation entre between higher education and counseling may be related to the greater understanding individuals with higher educational levels have in adhering to the recommendations used in physical activity counseling¹⁸. Additionally, it is speculated that being separated/widowed may have been associated with physical activity counseling because this group is assumed to engage in collective social programs with the aim of socializing and forming new emotional bonds^{41,42}. Furthermore, among Program users, there may be a focus on counseling for physical activity for individuals who are overweight, considering the associated health risks and the need for increased care⁴³, which could justify the identified association.

Although the time of participation in the program has not been explored as a variable possibly related to the interrelation of physical activity counseling and sociodemographic variables by studies previously published^{44,45}, the time of participation in a program that aims to modify lifestyle habits makes it possible to identify human behaviors related to health, such as whether individuals who receive information related to lifestyle changes are more willing to make such changes or not, that is, if they believe that the pros are more important than the cons for adopting these new habits⁴⁶. In this sense, it is hypothesized that the older age among program users may have been associated with physical activity counseling because in addition to individuals of older age having a better perception regarding the adversities that the addition of years of life has on their own health⁴⁷, it is speculated that participants with less than one year of the program are more motivated - and thus more receptive to performing the activities developed in the program, such as physical activity counseling. In addition, it is possible that individuals who started the program less than a year ago feel the need for support to per-

Table 3. Crude and adjusted logistic regression analysis for the association between counseling on physical activity during the Covid-19 pandemic and sociodemographic variables, according to body mass index, in participants of the Academia da Saúde Program, Brazil – 2022 (n=979).

Variables	n (%)	Crude analysis				Adjusted analysis				
		Normal weight		n (%)	Overweight/ Obese		Normal weight		Overweight/ Obese	
		OR	% (95%CI)		OR	% (95%CI)	OR	% (95%CI)	OR	% (95%CI)
Sex ^a										
Male	9 (8.25)	1		18 (5.28)	1		1		1	
Female	98 (91.74)	0.78	(0.23-2.64)	342 (94.71)	1.66	(0.71-3.87)	0.83	(0.27-2.54)	1.67	(0.73-3.81)
Age ^b										
20-59 years	66 (62.00)	1		270 (75.00)	1		1		1	
≥60 years	44 (37.99)	1.36	(0.96-1.92)	90 (24.99)	0.99	(0.51-1.92)	1.68	(1.05-2.69)*	1.04	(0.62-1.76)
Years of education ^c										
0-8 years	38 (33.63)	1		130 (36.09)	1		1		1	
9-11 years	43 (43.02)	1.03	(0.61-1.73)	176 (49.10)	1.21	(0.70-2.07)	1.06	(0.67-1.67)	1.27	(0.85-1.89)
12 years or more	26 (23.34)	1.21	(0.96-1.53)	54 (14.79)	1.01	(0.71-1.44)	1.26	(1.09-1.47)*	1.03	(0.79-1.35)
Marital Status ^d										
Single	17 (16.68)	1		63 (17.96)	1		1		1	
Married	70 (68.37)	1.14	(0.68-1.90)	236 (64.97)	1.26	(0.77-2.04)	1.12	(0.62-2.00)	1.30	(0.86-1.96)
Separated/ Widowed	20 (14.94)	0.56	(0.26-1.21)	61 (17.06)	1.24	(0.96-1.60)	0.45	(0.15-1.27)	1.23	(1.09-1.38)*

≥: greater or equal; CI: Confidence interval; OR: odds ratio; *: indicative of association.

a: Results adjusted for age, years of education, marital status, length of participation in the program;

b: Results adjusted for sex, years of education, marital status, length of participation in the program;

c: Results adjusted for sex, age, marital status, length of participation in the program;

d: Results adjusted for sex, age, years of education, length of participation in the program.

form physical activity safely and adequately, being more prone to receiving counseling.

Regarding females being more likely to receive physical activity counseling during the pandemic, it is speculated that the higher proportion of morbidities associated with the development of severe forms of Covid-19 in females (non-communicable chronic diseases)⁴⁸ may have contributed to the identified association. Furthermore, due to the prioritization of care for individuals with Covid-19 infection and the consequent delay or suspension of elective procedures and medical appointments, individuals with other adverse clinical conditions, such as chronic illnesses, may have been neglected, contributing to the establishment of an even sicker population⁴⁹. Additionally, the emergence of the pandemic, coupled with technical and managerial challenges^{26,50} (i.e., resource shortages, difficulties in conducting tests, challenges in communicating with the population), may have impacted the quality of

healthcare services and, consequently, resulted in a reduction in physical activity counseling for the population. Also, in relation to the period during Covid-19, higher education may be related to physical activity counseling due to the fact that individuals with higher education supposedly had to perform work activities at home⁵¹, presenting higher levels of stress and compromising mental health⁵¹, being engaged in physical activity given the relationship of this variable as a protective factor for these morbidities⁵². Additionally, it is speculated these individuals possess greater financial resources to participate in physical activity during this period (e.g., purchasing adequate equipment and the possibility of joining paid physical activity programs)⁵³.

This study has several noteworthy strengths, including the presentation of data from all five geographical regions of Brazil, stratified information by subgroups according to BMI and time of participation in the program, and compara-

Table 4. Crude and adjusted logistic regression analysis between counseling on physical activity before the Covid-19 pandemic and sociodemographic variables, according to program duration, in participants of the Academia da Saúde Program, Brazil – 2022 (n=979).

Variables	n (%)	Crude analysis				Adjusted analysis				
		< 1 year		≥1 year		< 1 year		≥1 year		
		OR	% (95%CI)	n (%)	OR	% (95%CI)	OR	% (95%CI)	OR	% (95%CI)
Sex^a										
Male	30 (7.68)	1		28 (6.16)	1		1		1	
Female	353 (92.31)	1.02	(0.75-1.39)	437 (93.83)	1.29	(0.23-7.31)	0.97	(0.69-1.38)	1.26	(0.23-6.69)
Age^b										
20-59 years	291 (74.90)	1		321 (70.46)	1		1		1	
≥60 years	92 (25.09)	1.45	(0.61-3.40)	144 (29.53)	0.91	(0.57-1.45)	2.01	(1.12-3.61)*	0.78	(0.46-1.31)
Years of education^c										
0-8 years	133 (34.47)	1		184 (39.54)	1		1		1	
9-11 years	181 (47.43)	1.15	(0.64-2.04)	215 (46.25)	1.06	(0.37-3.03)	1.57	(0.88-2.81)	1.00	(0.38-2.60)
12 years or more	69 (18.09)	1.36	(0.99-1.87)	66 (14.20)	0.36	(0.16-0.78)	1.87	(0.96-3.65)	0.34	(0.17-0.68)
Marital Status^d										
Single	80 (20.45)	1		81 (17.46)	1		1		1	
Married	229 (60.21)	1.04	(0.48-2.22)	308 (66.78)	1.17	(0.60-2.29)	1.06	(0.54-2.08)	1.09	(0.51-2.32)
Separated/Widowed	74 (19.32)	0.83	(0.39-1.79)	76 (15.74)	0.83	(0.32-2.15)	0.77	(0.42-1.42)	0.75	(0.29-1.96)

≥: greater or equal; CI: Confidence interval; OR: odds ratio; *: indicative of association.

a: Results adjusted for age, years of education, marital status, body mass index;

b: Results adjusted for sex, years of education, marital status, body mass index;

c: Results adjusted for sex, age, marital status, body mass index;

d: Results adjusted for sex, age, years of education, body mass index.

bility across different periods of physical activity counseling (pre-pandemic and during the pandemic). Another positive aspect is the sample design (complex sampling), which assigns different weights to the probabilistic selection of sample elements, resulting in more precise and representative population estimates⁵⁴. However, some limitations must be noted, including that the total sample of participants was smaller than initially estimated (80.7% of the total sample). The use of questionnaires to obtain information about past events can introduce recall bias and, in turn, reduce the accuracy of the information. Furthermore, in the present study, only the duration of participation and frequency in the Program or Center were investigated, which prevents the distinction between participants in physical activity groups and participants in other activities, which can be considered a limitation. Another limitation of this study was its cross-sectional design, which does not allow for the establishment of causality

or temporality for the tested associations. The insufficient number of male individuals in some association analyses of this study is another limitation. Nevertheless, this subgroup was included given the relevance of descriptive data about this population, as despite being a minority, they also represent the population in community health promotion services. Additionally, only the presence/absence of physical activity counseling was evaluated in this study. Therefore, future studies reporting on other conditions such as frequency, duration of counseling, and the method used are necessary to verify whether physical activity counseling can be a predictor of increased levels of physical activity and to confirm results on the direct relationship between physical activity counseling and sociodemographic variables. Finally, the insufficient available statistical power for most of the tested associations may have contributed to the non-identification of associations between exposures and outcomes.

Table 5. Crude and adjusted logistic regression analysis between counseling on physical activity during the Covid-19 pandemic and sociodemographic variables, according to program duration, in participants of the Academia da Saúde Program, Brazil – 2022 (n=979).

Variables	n (%)	Crude analysis				Adjusted analysis				
		< 1 year		N (%)	≥1 year		< 1 year		≥1 year	
		OR	% (95%CI)		OR	% (95%CI)	OR	% (95%CI)	OR	% (95%CI)
Sexa										
Male	14 (6.10)	1		13 (5.83)	1		1		1	
Female	212 (93.89)	1.62	(1.25-2.10)*	228 (94.16)	1.18	(0.26-5.23)	1.74	(1.43-2.11)*	1.18	(0.28-4.89)
Ageb										
20-59 years	168 (73.12)	1		168 (71.97)	1		1		1	
≥60 years	58 (26.87)	1.35	(0.89-2.05)	73 (29.02)	0.93	(0.51-1.69)	1.70	(1.01-2.86)	0.93	(0.55-1.58)
Years of educationc										
0-8 years	75 (33.13)	1		93 (37.81)	1		1		1	
9-11 years	106 (47.45)	1.12	(0.75-1.67)	113 (47.96)	1.17	(0.64-2.15)	1.29	(0.91-1.84)	1.16	(0.72-1.88)
12 years or more	45 (19.40)	1.38	(0.94-2.02)	35 (14.22)	0.81	(0.54-1.21)	1.63	(1.09-2.44)*	0.83	(0.61-1.13)
Marital Statusd										
Single	43 (19.76)	1		37 (15.66)	1		1		1	
Married	142 (62.09)	1.16	(0.55-2.42)	164 (69.24)	1.34	(0.96-1.87)	1.13	(0.52-2.46)	1.35	(1.02-1.78)
Separated/ Widowed	41 (18.14)	0.90	(0.68-1.17)	40 (15.08)	1.07	(0.74-1.53)	0.77	(0.48-1.22)	1.08	(0.83-1.40)

≥: greater or equal; CI: Confidence interval; OR: odds ratio; *: indicative of association.

a: Results adjusted for age, years of education, marital status, body mass index;

b: Results adjusted for sex, years of education, marital status, body mass index;

c: Results adjusted for sex, age, marital status, body mass index;

d: Results adjusted for sex, age, years of education, body mass index.

Conclusions

In conclusion, nine out of 10 users of the “Academia da Saúde” Program reported receiving some type of physical activity counseling before the Covid-19 pandemic, but this number reduced to five out of 10 users during the pandemic. Furthermore, the association between physical activity counseling and sociodemographic variables differs according to BMI and participation time in the program. Before the Covid-19 pandemic, being 60 years of age or older was directly associated with physical activity counseling among individuals with up to one year of program participation. During the Covid-19 pandemic, being 60 years of age or older and having a higher number of years of education were directly associated with physical activity counseling among those classified as having normal weight, and being separated/widowed was directly associated with physi-

cal activity counseling among those classified as overweight/obesity. Additional results from this study indicated that during the pandemic, being female and having a higher number of years of education were directly associated with physical activity counseling. These results could help healthcare professionals and public health managers define better strategies, taking into account the groups susceptible to lower likelihood of receiving physical activity counseling. Furthermore, they could assist in the continuity of this strategy even in challenging circumstances, such as the Covid-19 pandemic, by considering a personalized and effective approach within the context of the Brazilian community health promotion program.

Contributions

The authors contributed equally the conception and design of the study, acquisition of data, analysis and interpretation of data, drafting the article or revising it critically for important intellectual content, and final approval of the version to be submitted.

Ethical approval

The study was approved by the Ethics and Research Committee with Human Beings of the Federal University of Santa Catarina (protocol no. 5.040.451).

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