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Home office and health outcomes of adults in southern Brazil

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ABSTRACT

Introduction: During the COVID-19 pandemic, the home office was of paramount importance for the continuity of work functions and home economic maintenance. However, this practice can influence the population's lives. **Objective:** To assess the relationship between working from home during the COVID-19 pandemic and health outcomes in two cities in Southern Brazil. **Methods:** This is a cross-sectional, population-based study, conducted between 2020 and 2021, in two cities from Southern Brazil: Criciúma (Santa Catarina) and Rio Grande (Rio Grande do Sul). Individuals aged 18 years or older, residing in the urban area of the cities, were eligible for the study, and the sampling process was conducted in two stages, with the random selection of census tracts and households. The exposure variable was the home office during the pandemic. The outcomes studied were sleep, physical activity, body weight, food consumption, smoking, and alcohol intake. **Results:** 2,170 individuals were studied, and the prevalence of home office was 7.7%. Higher prevalence of home office was found in individuals aged up to 49 years ($p<0.001$), white skin color ($p=0.036$), university education ($p<0.001$) and richer ($p<0.001$). In the adjusted analysis, the home office was associated with more likely to increase the practice of physical activity (PR=1.95; 95%CI 1.06-3.58) and increasing the consumption of healthy foods (PR=2.37; 95%CI 1.58-3.54), during the COVID-19 pandemic. **Conclusion:** These results demonstrate that home office during the COVID-19 pandemic had positive repercussions on some health outcomes in adults from Southern Brazil.

Keywords: COVID-19; work; social isolation; Pandemics.

INTRODUCTION

The first cases of COVID-19 were detected in Wuhan, a Chinese city, at the end of 2019. Initially, the disease was described as pneumonia of unknown etiology, but it soon progressed and began to be detected in other countries, until it became something difficult to control and was declared a pandemic[1]. This scenario brought about the need to adapt to the daily lives of the population[2] and, at the same time, other concerns arose, including economic and social difficulties and the impact on mental health[3].

Due to the containment measures imposed by the new coronavirus, many companies and professionals have had to adapt to a modern style of working, known as the home office. The term "home office" is used to refer to the act of working from home, remotely, without necessarily being at a physical workplace, using information technology[4]. During the COVID-19 pandemic, the home office was of paramount importance for the continuity of work functions and the economic maintenance of the home.[5].

Studies conducted during the COVID-19 pandemic have shown some important associations when it comes to working from home. Specifically in Brazil, workers have had to face various changes, such as changes in sleep, physical activity, and diet.[6]. Research conducted during the COVID-19 pandemic has found an association between working from home and both positive and negative health outcomes[7-10].

An international study showed that starting remote work was associated with a decrease in physical and mental well-being and, consequently, an increase in negative mental and physical health symptoms. The authors also point out that better well-being was associated with greater physical activity, greater consumption of healthy foods, and less consumption of unhealthy foods[7]. Brazilian studies observed a higher prevalence of becoming active and a lower likelihood of physical inactivity in individuals who were

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working from home[8,9]. Comparable results were also found in the United Kingdom and the United States[8,10].

Considering the influence that remote work can have on the life and health of the population, investigating which aspects of health were related to the adoption of this practice is of paramount importance for understanding the effects of the COVID-19 pandemic on society.

Therefore, this study aimed to assess the relationship between working from home during the COVID-19 pandemic and health outcomes in two municipalities in southern Brazil.

METHODS

Study design and sample

This is a cross-sectional, population-based study conducted in two municipalities in southern Brazil: Criciúma (SC) and Rio Grande (RS). Criciúma has approximately 217,311 inhabitants, a Human Development Index (HDI) of 0.788, and a population density of around 815.87 inhabitants per km^2. Rio Grande has 211,965 inhabitants, an HDI of 0.744, and a population density[11] of 72.79 in habitants per km^2.

The study called “Mental COVID: impact of COVID-19 on the Mental Health of the Population” was conducted during the COVID-19 pandemic, from October 2020 to January 2021. The individuals eligible to take part in the study were those aged 18 or over who lived in the urban area of the two municipalities. Individuals who had physical or cognitive limitations to complete the survey questionnaire were excluded from the study.

The sampling process took place in two stages, according to the Brazilian Demographic Census[12]. First, the primary units (census tracts) were selected at random. Subsequently, the secondary units (households) were also selected at random, according

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to the census tracts drawn in the previous stage. In Criciúma, of the 307 census tracts belonging to the urban area, 60 were selected, resulting in 15,765 households, of which 607 were systematically selected to take part in the study. In Rio Grande, of the 327 census tracts, 90 were selected, resulting in 29,734 households, of which 900 were systematically selected for the study.

Data collection

For data collection, a single, pre-coded, and standardized questionnaire was used, containing sociodemographic, behavioral, health, and COVID-19 pandemic-related information, with an average application time of 30 minutes. The interviews were conducted in person at the participants' homes, by trained interviewers using personal protective equipment to avoid contamination by SARS-CoV-2. The questionnaire was administered using tablets, using RedCap® software.

Variables studied

The remote work (home office) variable was collected through the question "How has the social distancing imposed by the COVID-19 pandemic affected your job/work?". The answer options were: "I didn't work before and continued not working"; "I continued working normally"; "I continued working, but from home (home office); 'I started working during the pandemic'; 'I lost my job or stopped working' and 'Other'. Working from home was identified by the answer "I continued working, but from home, remotely;" the others were classified as "not" working from home.

The sociodemographic variables were: gender (male, female), age (collected in complete years and categorized as 18-29, 30-39, 40-49, 50-59, 60 or over), skin color (collected as white, black, brown, yellow, indigenous, and dichotomized as white and

non-white), schooling (none, elementary school, secondary school, higher education), and wealth index (categorized in tertiles, with the 1st tertile corresponding to the poorest and the 3rd to the richest).

Sleep duration was calculated using the difference between bedtime and wake-up time (Monday to Friday) reported by the participants and classified as adequate (between 7 and 8 hours a day) and inadequate (less than 7 hours or 9 hours or more a day)[13]. Sleep quality corresponded to the interviewees' perceptions and was classified as particularly good/good, fair, and poor/extremely poor. The following were also assessed: physical activity (dichotomized into <150 or ≥150 minutes per week)[14,15], change in physical activity during the pandemic (increased, decreased, or remained the same), change in body weight during the pandemic (increased, decreased, or remained the same), overweight (defined as a body mass index ≥25Kg/m^2 for adults[16] and ≥27Kg/m^2 for the elderly[17], and dichotomized into no and yes), change in the quantity of food during the pandemic (no, increased or decreased consumption), and change in the quality of food during the pandemic (no, increased consumption of healthy foods or increased consumption of unhealthy foods). Regular consumption (defined as consumption on 5 or more days of the week and dichotomized as no or yes) of the following foods was assessed: fruit, vegetables, sweets, and soft drinks.

Smoking was analyzed using the following question: “Do you currently smoke?” with answer options: no; yes, every day; yes, but not every day. For the analyses, smoking was dichotomized into “no” and “yes” (yes, every day; yes, but not every day). Similarly, alcohol consumption was analyzed using the question: “Do you currently consume alcohol?” with answer options: no and yes. Abusive alcohol consumption was defined as the consumption of five or more doses of alcoholic beverages on a single occasion in the

last 30 days for men, and four or more doses for women[17], and dichotomized into no and yes.

Statistical analysis

Descriptive analyses were conducted on the variables studied, showing the absolute (n) and relative (%) frequencies of all the variables and their respective 95% confidence intervals (95%CI). The crude analysis of the association between home office and sociodemographic variables and health outcomes was evaluated using Fisher's exact test with a significance level of 5%.

Adjusted analyses were also conducted to assess whether the association between home office and health outcomes was independent of sociodemographic characteristics. For this, multinomial logistic regression was used, with the odds ratio (OR) and its respective 95%CI as the measure of effect. The statistical program Stata version 12.1 was used to analyze the data.

Ethical considerations

All the individuals who agreed to take part in the study provided verbal consent at the time of the interview. The study was approved by the National Research Ethics Committee in July 2020 under opinion number 4.162.424 and (CAAE: 30955120.0.0000.5324).

RESULTS

A total of 2,170 individuals were studied (75% response rate). The majority were female (59.7%), half were aged between 18 and 49 (49.9%) and a third were elderly (60 or over) (31.2%) and 84% reported having white skin color. In addition, 40.6% of the

participants completed elementary school, and around a quarter had completed higher education (25.6%). The prevalence of people who started working from home during the pandemic (home office) was 7.7% (95%CI 6.7; 8.9), with no difference between the sexes. Individuals who were young adults (18 to 49 years old) ($p<0.001$), white ($p=0.036$), with a higher level of education (higher education) ($p<0.001$), and belonging to tercile 3 of the wealth index (wealthier) ($p<0.001$) had a higher prevalence of working from home (Table 1).

Around a quarter of respondents had insufficient physical activity and 39.3% of them reported having decreased their physical activity during the COVID-19 pandemic. In addition, almost 40% reported an increase in body weight during the pandemic. Approximately one-third of individuals reported an increase in food consumption during the pandemic. In addition, 18.8% increased their consumption of foods considered healthy and 18.2% increased their consumption of foods considered unhealthy (Table 2).

In the crude analysis between the home office and the health outcomes studied, individuals working from home had a higher prevalence of adequate sleep duration (57.1% vs 45.3%; $p=0.004$), sufficient physical activity (44.0% vs 23.1%; $p<0.001$), increased physical activity (15.4% vs 4.7%; $p<0.001$), consumption of healthy (32.7% vs 17.7%; $p<0.001$) and unhealthy foods (24.4% vs 17.7%; $p<0.001$), regular consumption of sweets (39.3% vs 29.1%; $p=0.007$) and alcohol consumption (26.1% vs 10.5%; $p=0.038$) when compared to those who were not working from home. On the other hand, lower prevalences of smoking (6.6% vs 14.9%; $p=0.002$) and increased body weight (37.7% vs 47.0%; $p=0.013$) were found among home office workers. After adjusting for possible confounding factors, home office remained associated with physical activity and changes in diet quality, i.e. individuals who worked from home were approximately twice as likely to increase their physical activity during the pandemic (OR=1.95; 95%CI 1.06;

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3.58) and their consumption of healthy foods (OR=2.37; 95%CI 1.58; 3.54) when compared to those who did not work from home (Table 2).

DISCUSSION

This study, which aimed to analyze the relationship between working from home and some health outcomes, showed that individuals who started working from home during the pandemic were more likely to increase their physical activity and consumption of healthy foods, representing positive changes in the lifestyle of this population.

Reports on the practice of remote work have been around since the 19th century, but it was at the end of the 20th century that progress was made in this type of work, in developed countries, because of the third Industrial revolution[18,19]. However, the home office has been significantly boosted since 2020 because of the COVID-19 pandemic. At this time, social isolation was necessary to contain the spread of the new coronavirus, and the performance of professional activities in the home environment became essential to maintain the economy[20].

Approximately 8% of the population interviewed in this study reported working from home. A study conducted between May and November 2020 measured the home office in Brazil and found that 8.2 million people, corresponding to 11% of the employed Brazilian population, worked from home during the COVID-19 pandemic[21].

In the country, the home office modality had already been discussed and put into practice by small business sectors before 2020, and in 2017 its implementation was even regulated by law[18]. In a post-pandemic reality, studies already show that around 74% of Brazilian companies are interested in making the home office a permanent working method[18].

Working from home was more common among individuals aged up to 49, with white skin color, higher education, and who belonged to the 3rd tercile of the wealth index (wealthier). The profile of this population is in line with other studies. In a study conducted in the municipalities of Ouro Preto and Mariana, a higher frequency of remote work was found in individuals aged between 35 and 59, with more than 9 years of schooling and earning more than four minimum wages[9].

Another survey conducted by the Institute for Applied Economic Research during the COVID-19 pandemic found that remote work was more frequent among Brazilians with white skin color, between 30 and 39 years old, and with higher education. Similarly, a study conducted in Portugal during the pandemic with remote workers found that the majority of those interviewed were aged between 40 and 49 and had higher education[22]. However, in the latter two studies, only descriptive analyses were conducted, and no statistical differences were shown. Ianni et al.[23] and Araújo et al.[24] note in their studies that this was the sociodemographic profile of remote workers in Brazil during the COVID-19 pandemic.

This study found that, during the pandemic period, there was a considerable increase in the practice of physical activity reported by the interviewees. This is a positive lifestyle change that can bring benefits to workers' cardiovascular, metabolic, immunological, and mental health during the pandemic, especially when moderate-intensity physical activity lasting 150-300 minutes/week is conducted[25-28].

Although a cross-sectional study of 39,963 Brazilians in 2020 found a 26% increase in self-reported physical inactivity[8], cross-sectional studies carried out in the United Kingdom and the United States, during the first semester of social isolation, corroborate the results found in the present study, since they also found an increase in physical activity, including in home office workers[10,29]. In addition, a Brazilian study

conducted during the COVID-19 pandemic found that working from home was associated with a lower likelihood of physical inactivity[9].

Due to the loss of loved ones, social isolation, and uncertainty, the pandemic has impacted the quality of the population's health in many ways, leading to a higher prevalence of stress and anxiety, factors that can lead to unhealthy lifestyle habits[30,31]. The practice of physical activity is an option for tackling these habits, encouraged by the World Health Organization (WHO), as it is associated with lower levels of stress, anxiety, and depression, as well as lowering the risk of various chronic diseases and strengthening the immune system[30-33]. These questions are in line with the findings of the study by Greaney et al.[10], in which patients who had COVID-19 started practicing more physical activity to have healthier habits and a lower risk of contracting the disease again.

Specifically, among workers, practicing physical activity was seen as a way of improving their work performance[29]. In addition, working from home can enable a more flexible work schedule, including fewer hours of work and commuting, which makes physical activity feasible and better adapted to the routine of this population. Higher levels of education and a higher income are also characteristics usually found in individuals who work from home and can have a positive influence on physical activity[9].

Another important result observed in this study was the increased consumption of healthy foods among individuals who worked from home. Similarly, an online survey was conducted with 988 individuals, from April to June 2020, to understand what factors contributed to physical and mental well-being in workers who had to make the transition from physical work to remote work during the pandemic. The authors pointed out that improved well-being was positively related to the consumption of healthier foods, physical exercise, communication with coworkers, and low junk food intake. On the other hand, decreased well-being was related to decreased consumption of healthy foods,

decreased physical exercise, distractions, and higher consumption of junk food[1]. In addition, another Lebanese cross-sectional study carried out in 2020 with 2,282 participants, found that during the period of social isolation, there was an increase in the consumption of legumes and the cereal group, while there was a decrease in the consumption of sugary drinks, snacks, sweets, oils and fats[34].

The change in the frequency of food consumed and the population's food quality may be associated with the restrictions resulting from social isolation due to the COVID-19 pandemic. During this period, commercial establishments such as restaurants and snack bars were closed, and only essential services such as hospitals, health units, markets, pharmacies, and means of communication and transportation that could provide supplies remained in operation[35,36]. In addition, during the pandemic there has been greater concern about the population's diet, to make it healthier and with a higher consumption of vitamins and minerals, including using nutritional supplements. These are issues that may be associated with strengthening the immune system and therefore aimed to prevent infection by the new coronavirus[33].

For Black et al.[37], work can influence dietary choices and behaviors. In this way, the home office may have contributed to increased autonomy and greater flexibility in workers' working hours, which would allow more time to conduct tasks such as preparing nutritionally healthy meals, as well as practicing physical activity[7,38].

In addition, the level of education and income can be intricately linked to food choice, since a diet with a greater variety of healthy and nutritious foods has a higher value when compared to a diet rich in simple carbohydrates and sweets[39]. Thus, the home office was an effective way for workers to continue their work activities, even with the restrictive measures imposed to contain the spread of COVID-19[36]. Thus, it is possible to

speculate that this has allowed them to maintain their source of income, contributing to a healthier diet.

One limitation is the cross-sectional design of the study, which does not allow causality to be established in the results, so they need to be interpreted with caution. In addition, physical activity and food consumption were collected subjectively and may be subject to recall bias. We should also point out that alcohol consumption and smoking were reported by the interviewees, which may underestimate the frequency of these behaviors. Furthermore, it was not possible to assess other variables related to working from *home*, such as the working environment, working hours, and remuneration, since questions on these aspects were not included in the questionnaire applied to the survey. On the other hand, the two-stage sampling process, which included a representative sample of the adult and elderly population in two municipalities in southern Brazil, can be considered a strength. It should also be noted that the interviews were conducted face-to-face, in the participants' homes, unlike most of the surveys conducted in this period, where data was collected online.

We conclude that during the COVID-19 pandemic, the prevalence of home office work was 7.7%, and was higher among individuals aged up to 49, with white skin color, higher levels of schooling, and higher levels of assets. The practice of this work style during the pandemic was related to a higher prevalence of increased physical activity and increased consumption of foods considered healthy when compared to those who were not working from home. These results contribute to understanding the impact of the COVID-19 pandemic and the practice of home office on the health of adults in the southern region of Brazil and serve as a tool for reflection on these outcomes in other contexts.

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Table 1: Characteristics of individuals and prevalence of home office according to sociodemographic variables. Criciúma/SC and Rio Grande/RS, Brazil, 2021. (n=2,170)

Variables	Total sample	Home office	
	n (%)	n (%)	p-value*
Sex			0.988
Male	875 (40.3)	68 (7.8)	
Female	1295 (59.7)	100 (7.7)	
Age			<0.001
18-29	394 (18.2)	41 (10.4)	
30-39	335 (15.4)	39 (11.6)	
40-49	354 (16.3)	45 (12.7)	
50-59	409 (18.9)	30 (7.3)	
60 or more	678 (31.2)	13 (1.9)	
Skin color			0.036
White	1815 (84.0)	150 (8.3)	
Not white	347 (16.0)	17 (4.9)	
Education			<0.001
None	40 (1.9)	0 (0.0)	
Elementary school	881 (40.6)	8 (0.9)	
High school	692 (31.9)	31 (4.5)	
Higher education	555 (25.6)	129 (23.2)	
Wealth index[a]			<0.001
1st tercile (poorest)	719 (34.7)	18 (2.5)	
2nd tertile	673 (32.5)	53 (7.9)	
3rd tercile (richest)	680 (32.8)	91 (13.4)	
Total	**2170 (100.0)**	**168 (7.7)**	

[a]Variable with the most unknown information: 4.5% (n=98).
*Fisher's Exact Test.

Table 2: Crude and adjusted association between home office and health outcomes. Criciúma-SC and Rio Grande-RS, Brazil, 2021.

Outcomes	Total sample n (%)	Home office			
		Crude analysis			Adjusted analysis
		No (%)	Yes (%)	p-value*	OR (95%CI)**
Sleep duration				0.004	
Inadequate	1167 (53.8)	1095 (54.7)	72 (42.9)		Reference
Adequate	1003 (46.2)	907 (45.3)	96 (57.1)		1.33 (0.94;1.87)
Sleep quality				0.486	
Very good/good	1509 (69.5)	1386 (69.2)	123 (73.2)		Reference
Regular	453 (20.9)	424 (21.2)	29 (17.3)		0.74 (0.50;1.10)
Bad/very bad	208 (9.6)	192 (9.6)	16 (9.5)		0.90 (0.47;1.71)
Physical activity (minutes/week)				<0.001	
<150	1624 (75.3)	1531 (76.9)	93 (56.0)		Reference
≥150	532 (24.7)	469 (23.1)	73 (44.0)		1.42 (0.96;2.11)
Changes in physical activity during the pandemic				<0.001	
Increased	120 (5.5)	94 (4.7)	26 (15.4)		1.95 (1.06;3.58)
Decreased	852 (39.3)	781 (39.0)	71 (42.3)		0.94 (0.63;1.41)
It stayed the same	1197 (55.2)	1126 (56.3)	71 (42.3)		Reference
Change in body weight during the pandemic				0.013	
Increased	826 (38.4)	79 (47.0)	747 (37.7)		1.19 (0.79;1.81)
Decreased	329 (15.3)	29 (17.3)	300 (15.1)		1.13 (0.68;1.90)
It stayed the same	997 (46.3)	60 (35.7)	937 (47.2)		Reference
Excess weight[a]				0.979	
No	815 (40.9)	748 (40.9)	67 (40.9)		1.01 (0.71;1.46)
Yes	1178 (59.1)	1081 (59.1)	97 (59.1)		Reference
Change in quantity of food				0.062	
No	1233 (57.2)	1151 (57.9)	82 (48.8)		Reference
Consumption increased	677 (31.4)	612 (30.8)	65 (38.7)		1.14 (0.76;1.70)
Decreased consumption	245 (11.4)	224 (11.3)	21 (12.5)		1.11 (0.60;2.02)
Change in food quality				<0.001	
No	1358 (63.0)	1286 (64.6)	72 (42.9)		Reference
Increased consumption of healthy food	406 (18.8)	351 (17.7)	55 (32.7)		2.37 (1.58;3.54)
Increased consumption of unhealthy foods	392 (18.2)	351 (17.7)	41 (24.4)		1.55 (0.92;2.61)
Regular fruit consumption				0.567	
No	874 (40.3)	810 (40.5)	64 (38.1)		1.04 (0.72;1.50)
Yes	1296 (59.7)	1192 (59.5)	104 (61.9)		Reference
Regular consumption of vegetables				0.322	
No	837 (38.6)	766 (38.3)	71 (42.3)		1.19 (0.83;1.72)
Yes	1333 (61.4)	1236 (61.7)	97 (57.7)		Reference
Regular consumption of sweets				0.007	
No	1521 (70.1)	1419 (70.9)	102 (60.7)		Reference
Yes	649 (29.9)	583 (29.1)	66 (39.3)		1.22 (0.85;1.75)
Regular consumption of soft drinks				0.088	
No	1563 (72.1)	1432 (71.6)	131 (78.0)		Reference
Yes	604 (27.9)	567 (28.4)	37 (22.0)		0.78 (0.51;1.19)
Smoking				0.002	
No	1861 (85.8)	1704 (85.1)	157 (93.5)		Reference
Yes	309 (14.2)	298 (14.9)	11 (6.6)		0.64 (0.32;1.32)
Alcohol consumption				0.038	
No	1932 (89.1)	1791 (89.5)	141 (83.9)		Reference
Yes	237 (10.9)	210 (10.5)	27 (26.1)		1.13 (0.69;1.83)
Alcohol abuse[b]				0.513	
No	90 (45.5)	81 (46.5)	9 (37.5)		0.80 (0.33;1.93)
Yes	108 (54.5)	93 (53.5)	15 (62.5)		Reference

[a]Variable with the highest number of unknown information: 8.2% (n=177).[b]Only for those who reported consuming alcohol.
OR: odds ratio. 95%CI: confidence interval. *Fisher's exact test. **Multinomial logistic regression.

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