

## Health behaviours and the adoption of individual protection measures during the new coronavirus pandemic: the ELSI-COVID-19 initiative

Comportamentos em saúde e adoção de medidas de proteção individual durante a pandemia do novo coronavírus: iniciativa ELSI-COVID-19

Comportamientos en salud y adopción de medidas de protección individual durante la pandemia del nuevo coronavirus: la iniciativa ELSI-COVID-19

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### Abstract

*The objective of this study was to evaluate whether healthy behaviours determine the adoption of individual protective measures to fight COVID-19. The data were obtained from the ELSI-COVID-19 initiative, a telephone survey conducted among participants in the Brazilian Longitudinal Study of Aging (ELSI-Brazil), which includes a national sample representative of the population aged 50 years or older. The outcomes evaluated were three protective measures (not having left home in the past week, wearing a mask when leaving home, and sanitizing hands when returning home), and the explanatory variables were health behaviours (smoking, alcohol consumption, consumption of fruits and vegetables, and physical activity). The associations were evaluated by logistic models, considering adjustments for potential confounding factors. A total of 5,827 individuals participated in the analysis; 32.2% did not leave home in the last week, and among those who left home, 97.5% used a face mask, and 97.3% sanitized their hands when they returned home. The practice of physical activity at the recommended levels was associated with a lower chance of not leaving home in the previous week. Ex-smokers were more likely to use a mask, and those who practised physical activity were less likely to adopt this protective measure. Individuals with low-risk alcohol consumption had a higher chance of sanitizing their hands. Actions aimed at increasing the adoption of protective measures to fight the new coronavirus should consider the existence of vulnerable groups, which can be identified by the distribution of other health behaviours in the population.*

*Coronavirus Infections; Health Surveys; Telephone Interviews; Epidemiologic Factors; Health Behavior*

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## Introduction

COVID-19, which is a respiratory disease caused by the new coronavirus (SARS-CoV-2), is an important public health emergency. The rapid expansion of a highly transmissible disease, coupled with the absence of a vaccine or effective treatment for this condition, requires the adoption of non-pharmacological measures aimed at reducing the transmission rate of the virus and avoiding the collapse of health systems. Measures of social distancing, isolation of cases, closure of schools and businesses, traffic restriction, and use of facial masks are among the most adopted strategies in different countries <sup>1,2,3,4</sup>.

Adherence to individual protection measures is extremely important for controlling the rapid spread of the virus <sup>1,5</sup>. Previous studies have shown wide variation in the adoption of these measures in different populations during the COVID-19 pandemic. The use of masks in public places was reported by 23.6% of adults in the USA <sup>6</sup>, by 63.2% of adults in South Korea <sup>7</sup> and by approximately 98% of adults in China <sup>8</sup> and Hong Kong (SAR China) <sup>9</sup>. Hand hygiene habits were frequently reported by 58.5% of respondents in Tokyo, Japan <sup>10</sup>, by 67.8% of respondents in South Korea <sup>7</sup> and by 92.3% of respondents in Hong Kong <sup>9</sup>. Regarding social distancing, 41.5% of the adults who participated in the survey in South Korea reported avoiding places with crowds of people <sup>7</sup>, while this percentage reached more than 95% in China <sup>8,11</sup>. In Brazil, an online survey of approximately 45,000 participants, conducted between April 25<sup>th</sup> and May 25<sup>th</sup>, 2020, identified 75% adherence to social distancing <sup>12</sup>.

In general, individual preventive behaviours against epidemics may be influenced by psychosocial, demographic factors and health behaviours <sup>7,11,13,14,15,16</sup>. The use of masks in public places and the habit of washing hands frequently, for example, were more frequent among women, older individuals, those with a higher socioeconomic status, those with lower levels of stress, anxiety and depression and those with greater perception of the severity of the disease <sup>6,7,11,13,15</sup>. In turn, the associations between the adoption of protective measures and variables related to health behaviours are less explored in the literature. Recent studies have found no association between the adoption of these measures and smoking and alcohol consumption <sup>10,14</sup>. However, to our knowledge, these associations have not yet been explored in Latin American countries.

Health behaviours tend to cluster in populations. The adoption of a healthy behaviour increases the chance of adherence to other protective behaviours, as occurs for the main risk factors for chronic noncommunicable diseases <sup>17,18</sup>. Therefore, the hypothesis that is evaluated in this article is that individuals with healthy behaviours, such as not smoking, not consuming alcoholic beverages in a risky manner, consuming fruits and vegetables regularly and practising physical activity at recommended levels, tend to adhere more frequently to measures of individual protection during the COVID-19 pandemic.

Thus, the present study aims to evaluate whether healthy behaviours determine the adoption of individual protective measures (not leaving home, wearing a mask in public places, and washing hands) to fight COVID-19 among Brazilians aged 50 years or older.

## Methodology

### ELSI-Brazil design

The *Brazilian Longitudinal Study of Aging* (ELSI-Brazil) is a home-based survey on the living and health conditions conducted with a national sample of older adults, representative of the Brazilian population aged 50 years or older. Regarding the composition of the sample, municipalities were allocated into 4 strata according to the size of the resident population. For the first 3 strata, which consisted of municipalities with up to 750,000 inhabitants, the sample was selected in 3 stages (municipality, census tract, and household). For the fourth stratum, composed of large municipalities, the sample was selected in 2 stages (census tract and household) for all municipalities in this category. Considering this sampling strategy, the following estimate for participants was derived: 10,000 individuals belonging to the above age group and who were residing in 70 municipalities in different regions of the country. Further details can be found on the survey website (<http://elsi.cpqrr.fiocruz.br/>) and in

a previous publication <sup>19</sup>. The ELSI-Brazil was approved by the Research Ethics Committee of the Oswaldo Cruz Foundation, Minas Gerais (CAAE: 34649814.3.0000.5091), and all participants signed an informed consent form.

The baseline of the study was conducted in 2015 and 2016, and 9,412 Brazilians aged 50 years or older were interviewed. The second survey wave began in August 2019 but was interrupted on March 17<sup>th</sup>, 2020, due to the COVID-19 pandemic. To date, 9,177 individuals have been interviewed and examined. Participants provided their phone numbers (landline and/or mobile), as well as those of their main personal contacts, to enable locating them in the future.

### **Design of the telephone survey (ELSI-COVID-19)**

The ELSI-COVID-19 is an initiative designed to gather information regarding the new coronavirus epidemic among older Brazilian adults through telephone interviews with participants of the second wave of the ELSI-Brazil. All 9,177 participants interviewed until the interruption of data collection on March 17<sup>th</sup>, 2020, were eligible for this study. The telephone interview lasted approximately 5 minutes and included information on preventive measures, obtaining medications, COVID-19 diagnosis, use of health services and mental health aspects. The telephone interview was conducted by previously trained interviewers. Data collection was conducted between May 26<sup>th</sup> and June 8<sup>th</sup>, 2020. Among the 9,177 participants of the second wave of the ELSI-Brazil, 6,149 (67%) individuals participated in a telephone interview. Further details can be obtained in another publication <sup>20</sup>.

### **Variables**

The outcomes of the present study were adoption of three individual protective measures by the population against the COVID-19 pandemic; these data were collected in the ELSI-COVID-19 initiative. The measures considered were (a) not having left home (as an indicator of social distancing); (b) wearing a mask when leaving home; and (c) performing hand hygiene when returning home, always taking the last week as reference. The first outcome was evaluated by the answer “did not leave home” to the question “How many days did you leave your home last week?”; the use of a mask was evaluated by the answer “always” to the question “When you left your home last week, did you wear a mask?”; and hand hygiene was assessed by the answer “always” to the question “When you left your home last week, did you wash your hands or use hand sanitizer when you returned home?”. The last 2 questions were answered only by those who reported having left home in the week prior to the interview.

The explanatory variables collected in the second wave of the ELSI-Brazil were the following health behaviours: smoking (current smoker, former smoker, non-smoker), alcohol consumption (high-risk consumption, low-risk consumption, and non-consumption), consumption of fruits and vegetables at recommended levels (no and yes), and physical activity at recommended levels (no and yes).

Respondents who reported smoking 100 or more cigarettes in their lifetime and who continued to smoke at the time of the interview, regardless of frequency, were considered current smokers. Former smokers were those who reported having smoked 100 or more cigarettes in their lifetime but who had stopped smoking and did not smoke at the time of the interview. The others were considered non-smokers. The consumption of alcoholic beverages was evaluated by the frequency of consumption and number of doses per day. Participants who reported not consuming or consuming alcohol less than once a week were classified as non-consumers. Among the other individuals, women consuming 7 doses or less per week and men consuming 14 doses or less per week were considered low-risk consumers, while women consuming more than 7 doses per week and men consuming more than 14 doses per week were considered high-risk consumers, as recommended by the National Institute on Alcohol Abuse and Alcoholism <sup>21</sup>. In addition, participants who reported binge drinking, i.e., 4 or more doses/day for women and 5 or more doses/day for men, on a single occasion, were classified as risky consumers.

The recommended consumption of fruits and vegetables was based on the guidelines of the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO) <sup>22</sup>. To estimate this consumption, the weekly and daily frequency of fruits, fresh fruit juice, and vegetables consumption were considered. Individuals who reported the consumption of

fruits or juices and vegetables on 5 or more days of the week and who reported the daily consumption of fresh fruits or juices and vegetables greater than or equal to 5 portions were considered as meeting the recommended consumption of fruits and vegetables.

The level of physical activity was evaluated using the IPAQ (*International Physical Activity Questionnaire*), short version, which was translated and validated for Brazil<sup>23</sup>. The frequency (days per week) and duration (time per day) of physical activity performed for at least 10 continuous minutes in the week prior to the interview were considered. The activities included were (a) walking (at home or at work, as a way of transportation to get from one place to another, for leisure, for pleasure or as a form of exercise); (b) moderate activities (such as light bicycle riding, swimming, dancing, light aerobic exercises, recreational volleyball, light weightlifting, chores at home, in the backyard or in the garden such as sweeping, vacuuming, gardening, etc., but not including walking); and (c) vigorous activities (such as running, aerobics, soccer, cycling, basketball, heavy household chores at home, in the backyard or in the garden, weightlifting, etc.). Based on this information, the total physical activity time was estimated; notably, time spent in vigorous activities was counted twice. According to the recommendations of the WHO<sup>24</sup>, individuals who practiced physical activity for 150 minutes or more per week were classified as having the recommended levels of exercise.

The potential confounding factors were selected according to recent literature<sup>6,7,10,11,14,16</sup>, and all information regarding these factors was collected in the second wave of the ELSI-Brazil, including sex (female, male), age group (in years), education level in years of education (< 4, 4-7, and 8 or more), marital status (not married, married/in a stable relationship), skin colour (white, non-white), number of residents in the household (1, 2, 3 or more) and number of self-reported chronic conditions (none, 1, 2 or more), including hypertension, diabetes, infarction, heart failure, angina, depression, arthritis, cancer, renal failure, and asthma. In addition, the region of residence (North, Northeast, Southeast, South, and Central) was also included in this analysis.

### **Data analysis**

The characterization of the studied sample was performed for all variables included in the study via their proportional distribution, considering the total sample. The distribution of these variables according to the outcomes studied can be seen in the supplementary material ([http://cadernos.ensp.fiocruz.br/static/arquivo/csp-1954-20-material-suplementar-ing\\_1591.pdf](http://cadernos.ensp.fiocruz.br/static/arquivo/csp-1954-20-material-suplementar-ing_1591.pdf)).

The associations between health behaviours, which were evaluated in the second wave of the ELSI-Brazil, and individual protective measures to fight the new coronavirus, which were reported in the ELSI-COVID-19 initiative, were evaluated by logistic regression models by estimating odds ratios (OR) and their respective 95% confidence intervals (95%CI). Two regression models were constructed for each outcome, to wit, one crude model and one model adjusted for all confounding factors included in this analysis. Associations with p-values less than 5% were considered significant.

All analyses were performed in Stata, version 14.0 (<https://www.stata.com>), and the weight and the effect of the sampling design were considered. The weights were estimated specifically for those who responded to the telephone interview, and natural stratum, age, sex, and education level were considered<sup>20</sup>.

### **Results**

The present analysis included 5,827 older adults who participated in the ELSI-COVID-19 initiative and provided all the information considered. Regarding the prevalence of the evaluated outcomes, the results of the present study showed that 32.2% (95%CI: 29.1-35.4) of the respondents did not leave their homes in the last week. Among those who left their homes (n = 3,435), 97.5% (95%CI: 96.6-98.2) reported always using a face mask, and 97.3% (95%CI: 95.7-98.4) reported cleaning their hands after they returned to their homes.

Table 1 shows the characteristics of the sample for the total population. The analysed sample had a predominance of women (54.8%), individuals aged between 50 and 59 years (46.9%), individuals with 8 or more years of education (56.1%), individuals who were married (60.3%), individuals with white skin colour (52.5%), individuals living in households with 2 residents (39.6%), individuals living

in the Southeast region (40.6%) and individuals with no chronic condition (34.7%). In addition, most participants did not smoke (68%), did not consume alcohol (78.2%), did not meeting the recommended consumption of fruits and vegetables (88.3%), and met the recommended weekly physical activity level (52.9%).

Table 2 shows the distribution of health behaviours according to the outcome of not leaving home in the last week and describes the magnitude of the associations between health behaviours and this outcome. After adjusting for the considered confounding factors, those who met the recommended levels for physical activity had a lower chance of not having left the house in the previous week (OR = 0.69; 95%CI: 0.53-0.91).

**Table 1**

Distribution of the characteristics of the participants for the total population. ELSI-COVID-19 initiative, 2020.

Variables	% (95%CI)
Sex	
Women	54.8 (51.3-58.3)
Men	45.2 (41.7-48.7)
Age (years)	
50-59	46.9 (41.9-52.1)
60-69	29.3 (27.2-31.6)
70-79	16.3 (13.3-19.7)
80 or more	7.5 (5.9-9.5)
Education level (years)	
< 4	17.4 (14.7-20.6)
4-7	26.5 (23.8-29.4)
8 or more	56.1 (51.4-60.7)
Marital status	
Unmarried	39.7 (35.5-43.9)
Married/Common-law marriage	60.3 (56.1-64.5)
Skin colour	
White	52.5 (44.9-60.0)
Non-white	47.5 (40.0-55.1)
Number of residents in the household	
1	23.0 (18.9-27.6)
2	39.6 (36.5-42.9)
3 or more	37.4 (32.1-43.0)
Region of residence	
North	6.3 (1.8-19.1)
Northeast	26.8 (17.2-39.3)
Southeast	40.6 (27.9-54.8)
South	15.7 (7.5-29.9)
Central	10.6 (4.9-21.4)
Number of chronic conditions	
None	34.7 (31.0-38.6)
1	32.9 (30.6-35.3)
2 or more	32.4 (28.6-36.5)
Smoking	
Current smoker	11.2 (9.6-12.9)
Former smoker	20.8 (17.6-24.5)
Never smoked	68.0 (63.9-71.8)

(continues)

**Table 1 (continued)**

Variables	% (95%CI)
Consumption of alcoholic beverages *	
High-risk consumers	12.6 (9.9-15.9)
Low-risk consumers	9.2 (6.9-12.1)
Non-consumers	78.2 (74.6-81.4)
Recommended consumption of fruits and vegetables **	
No	88.3 (85.3-90.8)
Yes	11.7 (9.2-14.7)
Recommended level of physical activity ***	
No	47.1 (42.2-51.9)
Yes	52.9 (48.1-57.8)

95%CI: 95% confidence interval.

\* Low-risk consumers: women consuming 7 doses or less per week and men consuming 14 doses or less per week; High-risk consumers: women consuming more than 7 doses per week and men consuming more than 14 doses per week; also includes those who consumes 4 or more doses/day for women and 5 or more doses/day for men. on a single occasion in the last 30 days;

\*\* Consumption of 5 or more portions per day in 5 or more days of the week;

\*\*\* Individuals who practiced physical activity for 150 minutes or more per week. including walking. moderate activities and vigorous activities.

**Table 2**

Association between health behaviours and not having left home in the last week. ELSI-COVID-19 initiative, 2020.

Health behaviours	Left home last week (%)		OR (95%CI)	
	Yes	No	Unadjusted model	Adjusted model
Smoking				
Current smoker	11.0	11.3	1.00	1.00
Former smoker	21.1	20.4	0.94 (0.68-1.32)	0.77 (0.55-1.03)
Never smoked	67.9	68.3	0.98 (0.70-1.36)	0.72 (0.51-1.02)
Consumption of alcoholic beverages *				
High-risk consumers	15.0	7.5	1.00	1.00
Low-risk consumers	11.6	4.2	0.72 (0.36-1.42)	0.76 (0.37-1.56)
Non-consumers	73.4	88.3	2.39 (1.57-3.65)	1.61 (0.98-2.64)
Recommended consumption of fruits and vegetables **				
No	88.7	87.5	1.00	1.00
Yes	11.3	12.5	1.12 (0.76-1.65)	1.25 (0.84-1.85)
Recommended level of physical activity ***				
No	42.2	57.2	1.00	1.00
Yes	57.8	42.8	0.55 (0.43-0.69)	0.69 (0.53-0.91)

95%CI: 95% confidence interval; OR: odds ratio.

Note: OR and 95%CI estimated by logistic regression. The adjusted model includes, sex, age, education level, marital status, skin colour, number of residents in the household, region of residence and number of chronic conditions, in addition to variables listed in the table.

\* Low-risk consumers: women consuming 7 doses or less per week and men consuming 14 doses or less per week; High-risk consumers: women consuming more than 7 doses per week and men consuming more than 14 doses per week; also includes those who consumes 4 or more doses/day for women and 5 or more doses/day for men. on a single occasion in the last 30 days;

\*\* Consumption of 5 or more portions per day in 5 or more days of the week;

\*\*\* Individuals who practiced physical activity for 150 minutes or more per week. including walking. moderate activities and vigorous activities.

Table 3 shows the distribution of health behaviours according to the use of a face mask and describes the magnitude of the associations between these behaviours and mask use among those who left the home in the last week. Ex-smokers were more likely to wear a mask in public (OR = 1.89; 95%CI: 1.05-3.42) when compared to those who were current smokers. In turn, those who met the recommended levels of physical activity had a lower chance of adopting this protective measure (OR= 0.51; 95%CI: 0.31-0.86).

Table 4 shows the distribution of health behaviours according to hand hygiene among those who left home in the past week and describes the magnitude of the associations between health behaviours and this outcome. When compared to those who reported high-risk alcohol consumption, only the participants who reported low-risk alcohol consumption were more likely to adopt this individual protection measure (OR = 4.24; 95%CI: 1.08-16.64).

**Table 3**

Association between health behaviours and wearing a mask by those who reported having left home in the week prior to the interview. ELSI-COVID-19 initiative, 2020.

Health behaviours	Wearing a mask (%)		OR (95%CI)	
	No	Yes	Unadjusted model	Adjusted model
Smoking				
Current smoker	15.7	10.9	1.00	1.00
Former smoker	16.6	21.2	1.83 (1.07-3.13)	1.89 (1.05-3.42)
Never smoked	67.7	67.9	1.44 (0.76-2.73)	1.12 (0.58-2.17)
Consumption of alcoholic beverages *				
High-risk consumers	17.4	15.0	1.00	1.00
Low-risk consumers	13.1	11.6	1.03 (0.17-6.37)	0.59 (0.09-4.03)
Non-consumers	69.4	73.4	1.23 (0.61-2.51)	0.94 (0.45-1.95)
Recommended consumption of fruits and vegetables **				
No	97.3	88.5	1.00	1.00
Yes	2.7	11.5	4.67 (1.50-14.59)	3.29 (0.91-11.89)
Recommended level of physical activity ***				
No	33.0	42.5	1.00	1.00
Yes	67.0	57.5	0.66 (0.36-1.21)	0.51 (0.31-0.86)

95%CI: 95% confidence interval; OR: odds ratio.

Note: OR and 95%CI estimated by logistic regression. The adjusted model includes, sex, age, education level, marital status, skin colour, number of residents in the household, region of residence and number of chronic conditions, in addition to variables listed in the table.

\* Low-risk consumers: women consuming 7 doses or less per week and men consuming 14 doses or less per week; High-risk consumers: women consuming more than 7 doses per week and men consuming more than 14 doses per week; also includes those who consumes 4 or more doses/day for women and 5 or more doses/day for men, on a single occasion in the last 30 days;

\*\* Consumption of 5 or more portions per day in 5 or more days of the week;

\*\*\* Individuals who practiced physical activity for 150 minutes or more per week, including walking, moderate activities and vigorous activities.



**Table 4**

Association between health behaviours and hand hygiene by those who reported having left home in the week prior to the interview. ELSI-COVID-19 initiative, 2020.

Health behaviour	Performing hand hygiene (%)		OR (95%CI)	
	No	Yes	Unadjusted model	Adjusted model
Smoking				
Current smoker	24.5	10.7	1.00	1.00
Former smoker	22.9	21.0	2.11 (0.50-8.88)	1.82 (0.56-5.87)
Never smoked	52.6	68.3	2.98 (0.77-11.59)	2.26 (0.89-5.73)
Consumption of alcoholic beverages *				
High-risk consumers	33.8	14.5	1.00	1.00
Low-risk consumers	4.7	11.8	5.43 (1.11-26.52)	4.24 (1.08-16.64)
Non-consumers	63.4	73.7	2.54 (0.82-7.91)	1.83 (0.80-4.18)
Recommended consumption of fruits and vegetables **				
No	90.4	88.6	1.00	1.00
Yes	9.6	11.4	1.21 (0.40-3.62)	0.89 (0.29-2.76)
Recommended level of physical activity ***				
No	38.1	42.4	1.00	1.00
Yes	61.9	57.6	0.84 (0.38-1.82)	0.72 (0.35-1.47)

95%CI: 95% confidence interval; OR: odds ratio.

Note: OR and 95%CI estimated by logistic regression. The adjusted model includes, sex, age, education level, marital status, skin colour, number of residents in the household, region of residence and number of chronic conditions, in addition to variables listed in the table.

\* Low-risk consumers: women consuming 7 doses or less per week and men consuming 14 doses or less per week; High-risk consumers: women consuming more than 7 doses per week and men consuming more than 14 doses per week; also includes those who consumes 4 or more doses/day for women and 5 or more doses/day for men, on a single occasion in the last 30 days;

\*\* Consumption of 5 or more portions per day in 5 or more days of the week;

\*\*\* Individuals who practiced physical activity for 150 minutes or more per week, including walking, moderate activities and vigorous activities.

## Discussion

The results of the present study showed that approximately 1/3 of the Brazilian population aged 50 years or older did not leave home in the week prior to the interview, and among those who left home, almost all reported wearing a mask (97.5%) and sanitizing their hands when returning home (97.3%). In addition, not leaving home was significantly and negatively associated with the practice of physical activity at the recommended levels. The use of a mask in public was more frequent among ex-smokers, but those who practised physical activity at recommended levels were less likely to adopt this protective measure. Regarding the habit of sanitizing hands when returning home, only the group who reported low-risk alcohol consumption had a higher chance of adopting this measure of individual protection compared to those who reported high-risk alcohol consumption.

The adoption of social distancing practices, such as avoiding public or crowded places and staying home whenever possible, varies widely among the surveys conducted during the new coronavirus pandemic <sup>7,8,10,16,25</sup>. The percentage of adoption of these practices ranged from 29.6% in Tokyo <sup>10</sup> to 96.4% in China <sup>11</sup>, and these differences can be attributed mainly to the composition of the sample, which in most cases is intentional, regarding the period when the survey was conducted and how it



was conducted or the way questions were asked, including the reference period of the questions. In Hong Kong and Tokyo, for example, the percentage of the population that reported avoiding crowded places significantly increased during the SARS-CoV-2 pandemic period<sup>1,14</sup>. These increases may, therefore, portray the evolution of the epidemic in these locations, leading to the recommendation of new control measures, such as social distancing.

In Brazil, data from Vigitel (*Risk and Protective Factors Surveillance System for Chronic Non-Communicable Diseases Through Telephone Interview*) COVID-19 showed that 89.9% of the adult population residing in state capitals and the Federal District reported social distancing, which was considered as avoiding leaving home unless necessary, avoiding crowded or very crowded places, and avoiding close contact with other people, such as greetings or hugs<sup>26</sup>. However, another online survey conducted by the Oswaldo Cruz Foundation (Fiocruz), the Federal University of Minas Gerais (UFMG), and the State University of Campinas (Unicamp) with approximately 45,000 respondents showed that social distancing was performed by 75% of the respondents, of whom 60% reported having left home to go to a supermarket or pharmacy and 15% strictly stayed home and only left home for health needs, such as going to the doctor<sup>12</sup>. Therefore, the lowest percentage observed in the present study (32.2%) can be attributed to the more restrictive question (not having left home in the week prior to the interview), indicative of the proportion of older adults who adopted complete physical distancing. In any case, as of June 13th, 2020, Brazil ranked second in the world in the number of COVID-19 cases (850,514) and deaths (41,828)<sup>26</sup>, which demonstrates the need for greater adherence to physical distancing measures. Evidence indicates that social distancing is effective for reducing the spread of the virus and delaying the increase in the number of cases<sup>4,27,28</sup>, although the sustainability of this measure depends on the implementation of social protection policies, which should be considered by governments<sup>29</sup>.

Approximately 97% of the Brazilian population aged 50 years or older reported adopting the use of a face mask in public places and the habit of sanitizing hands after returning home, which is similar to what was observed in populations from other regions, such as China<sup>8,30</sup>, Hong Kong<sup>1,9</sup>, Pakistan<sup>25</sup> and Japan<sup>16</sup>. Individual protection measures are essential for controlling the transmission of respiratory diseases, although the effectiveness of the use of masks by the general population is questioned<sup>31,32</sup>. Even so, the adoption of these measures has been widely recommended<sup>32,33,34</sup> and may contribute to reducing the transmission of the virus and minimizing the duration of social distancing, which can have a negative impact on the economy and the mental health of populations<sup>5,35</sup>.

In the present study, reporting not having left home in the past week was less common among those who practised physical activity at the recommended levels. A reduction in physical activity and an increase in sedentarism during social distancing due to COVID-19 was reported in Brazil in an online survey. Among the elderly, for example, the prevalence of physical activity decreased from 30.4% to 14.2%<sup>36</sup>. However, a study conducted in Canada found that active individuals reported a higher increase in levels of physical activity during the pandemic than that reported by an inactive group<sup>37</sup>. This evidence may justify the inverse association observed in the present study, where individuals with higher levels of physical activity before the pandemic seek to maintain this practice by performing activities outside the home. Even though physical activity can minimize the negative effects of social distancing on the mental health of individuals<sup>38</sup>, recommendations should provide strategies, such as the use of digital technologies, and guide the population to help maintain this practice inside the home<sup>39,40</sup>.

The results of the present study showed that mask use in public places was more frequent among former smokers but less frequent among individuals who practised physical activity at recommended levels. Previous studies have not found a significant association between the adoption of COVID-19 control measures and smoking<sup>10,14,16</sup>. However, it is noteworthy that smoking cessation may be related to the adoption of other healthy behaviours, such as the increased consumption of fruits and vegetables and increased physical activity<sup>17,18</sup>, which may favour the understanding of the importance of other individual protection measures, such as those recommended to fight the new coronavirus.

Regarding the lower chance of wearing a mask among those who practised physical activity at the recommended levels, it is suggested that this individual protection measure may hinder the performance of physical exercise, causing discomfort when breathing. Some studies have reported discomfort due to the use of masks<sup>41</sup>, in addition to allergic skin reactions<sup>42</sup>, which may hinder adherence to this protective measure. In addition, the mask can cause resistance to inhalation,

making breathing more difficult with increased use time <sup>43</sup>, which can decrease adherence among practitioners of physical activity.

The habit of washing hands upon returning home was more common among individuals who reported low-risk alcohol consumption than among those who reported high-risk alcohol consumption. Although no other similar study was found in the context of the COVID-19 pandemic, it is noteworthy that low-risk alcohol consumption has been associated with a better diet and not smoking <sup>44,45</sup>, which may also be consistent with the adoption of personal hygiene measures, such as hand washing, as observed in the present study.

The results presented in this study should be interpreted considering the difficulty in comparing it with other studies due to the scarcity of similar investigations, the diversity of the age composition, the differences between the questions used in the surveys and the variation in the adoption of control measures by different countries and regions over time. In addition, the difficulties related to telephone interviews should be considered, such as non-responses, the refusal to provide information by phone, and the existence of invalid phone numbers or lack of telephone numbers in the second wave of the ELSI-Brazil. However, the use of calibrated weights has minimized this limitation. The evaluation of mask use and hand hygiene may have been affected by information bias, as individuals could tend to report socially acceptable behaviour, overestimating the adoption of these measures, which may have diluted the reported strengths of association.

In turn, the ELSI-COVID-19 initiative provides an excellent tool to explore aspects related to COVID-19 in a representative sample of the Brazilian population aged 50 years or older from different geographic regions of the country. In addition, the exposures evaluated in the present study were collected in a period immediately prior to the beginning of the epidemic in Brazil, making it possible to evaluate the temporal relationships between the exposures and outcomes investigated.

In conclusion, the results indicated that health behaviours, such as smoking, alcohol consumption, and physical activity, may predict the adoption of individual protective measures against the COVID-19 pandemic, thus enabling the identification of groups with higher and lower odds of adherence to these measures. However, the practice of physical activity at recommended levels tends to make staying at home and wearing a mask in public places difficult, causing challenges related to the control of virus transmission in this group. In this sense, communication strategies aimed at adequate adherence to measures by physically active individuals should be considered. Finally, the results of this study may contribute to the planning of actions aimed at increasing the adoption of individual protective measures by the population by using social and behavioural sciences models and considering that this adoption is not determined only by individual choices but may also depend on other health behaviours and the context in which individuals live <sup>46</sup>.

## Contributors

S. V. Peixoto and M. A. Nascimento-Souza contributed to the design of the article, data analysis and writing of the work. J. V. M. Mambrini contributed to the analysis and interpretation of data and writing of the work. F. B. Andrade and M. F. Lima-Costa contributed to the design of the study and revision of the manuscript. D. C. Malta contributed to the interpretation of the data, writing and revision of the manuscript.

## Additional informations

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## Resumo

O objetivo deste estudo foi avaliar se os comportamentos saudáveis determinam a adoção de medidas protetivas individuais para o combate à COVID-19. Os dados foram obtidos da iniciativa ELSI-COVID-19, inquérito telefônico conduzido entre os participantes do Estudo Longitudinal da Saúde dos Idosos Brasileiros (ELSI-Brasil), que inclui amostra nacional representativa da população com 50 anos ou mais. Os desfechos avaliados foram três medidas protetivas (não ter saído de casa na última semana, usar máscara quando saiu de casa e higienizar as mãos quando retornou para casa) e as variáveis explicativas foram os comportamentos em saúde (tabagismo, consumo de bebidas alcoólicas, consumo de frutas e hortaliças e prática de atividade física). As associações foram avaliadas por modelos logísticos, considerando-se o ajuste por potenciais fatores de confusão. Participaram da análise 5.827 indivíduos; 32,2% não saíram de casa na última semana; e entre os que saíram de casa, 97,5% usaram máscara facial e 97,3% higienizaram as mãos quando retornaram ao domicílio. A prática de atividade física nos níveis recomendados foi associada com menor chance de não sair de casa na semana anterior. Os ex-fumantes apresentaram maior chance de usar máscara e aqueles que praticavam atividade física tinham menor chance de adotar esta medida protetiva. Indivíduos com consumo de baixo risco de bebidas alcoólicas apresentaram maior chance de higienizar as mãos. Ações que visem ao aumento da adoção das medidas protetivas para o combate ao novo coronavírus devem considerar a existência de grupos vulneráveis, que podem ser identificados pela distribuição de outros comportamentos em saúde na população.

*Infecções por Coronavírus; Inquéritos Epidemiológicos; Entrevistas por Telefone; Fatores Epidemiológicos; Comportamento Relacionado com a Saúde*

## Resumen

El objetivo de este estudio fue evaluar si los comportamientos saludables determinan la adopción de medidas protectoras individuales para combatir la COVID-19. Los datos se obtuvieron del iniciativa ELSI COVID-19, encuesta telefónica llevada a cabo entre los participantes del Estudio Brasileño Longitudinal del Envejecimiento (ELSI-Brasil), que incluye una muestra nacional representativa de la población con 50 años o más. Los desenlaces evaluados fueron tres medidas protectoras: no haber salido de casa en la última semana, usar mascarilla cuando se salió de casa e higienizar las manos cuando se volvió a casa. Asimismo, las variables explicativas fueron los comportamientos en salud (tabaquismo, consumo de bebidas alcohólicas, consumo de frutas y hortalizas, así como la práctica de actividad física). Las asociaciones fueron evaluadas mediante modelos logísticos, considerando el ajuste por potenciales factores de confusión. Participaron en el análisis 5.827 individuos; un 32,2% no salió de casa en la última semana, entre quienes salieron de casa un 97,5% usaron mascarilla facial y un 97,3% se higienizaron las manos, cuando regresaron al domicilio. La práctica de actividad física en los niveles recomendados estuvo asociada con una menor oportunidad de no salir de casa en la semana anterior. Los exfumadores presentaron una mayor oportunidad de usar mascarilla y aquellos que practicaban actividad física tenían una menor oportunidad de adoptar esta medida protectora. Individuos con un consumo de bajo riesgo de bebidas alcohólicas presentaron una mayor oportunidad de higienizar sus manos. Las acciones que tengan como objetivo el aumento de la adopción de medidas protectoras para combatir al nuevo coronavirus deben considerar la existencia de grupos vulnerables, que pueden ser identificados por la distribución de otros comportamientos en salud dentro de la población.

*Infecciones por Coronavírus; Encuestas Epidemiológicas; Entrevista por Teléfono; Conductas Relacionadas con la Salud*

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