Preventive behavior against covid-19 and its relationship with the social and health conditions of older adults

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Abstract

Objective: To delineate the profile of preventive behavior against covid-19 adopted by older adults and investigate its correlation with social and health conditions. *Method*: A cross-sectional and analytical study conducted with 72 individuals ($\geq$ 60 years) enrolled in an Open University for Older Adults in the municipality of Campinas, São Paulo, Brazil. Participants were contacted via telephone from November 2020 to June 2021. A total of 11 preventive measures were scrutinized to identify the behaviors adopted by older adults against covid-19. Data analysis employed principal component analysis, Pearson's chi-square tests, and Fisher's exact tests, with a confidence level of 95%. *Results*: The adoption of preventive behaviors was assessed through activities such as hand hygiene with soap and water, use of hand sanitizer, wearing facial masks, and practicing social distancing. The majority of individuals reported the adoption of preventive behaviors (79.2%), and it was observed that those with incomes below four minimum wages exhibited higher proportions of compliance (87.5%) compared to individuals with incomes exceeding 10 minimum wages (46.2%) (p=0.038). *Conclusion*: Preventive measures against covid-19 were embraced by the older adults, influenced by income. The findings underscore the significance of educational strategies for fostering health preventive behaviors, taking into account the social context.

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INTRODUCTION

Coronavirus Disease (covid-19) affects the respiratory system, leading to severe acute respiratory syndrome (SARS). The epicenter of this disease was the capital Wuhan in the Hubei province of China, which reported cases since December 2019, attempting to contain the pathogenesis[1]. However, covid-19 rapidly spread worldwide and was declared a pandemic by the World Health Organization (WHO) on March 11, 2020[2].

In Brazil, as of September 8, 2023, the cumulative number of infected individuals was 37,783,855, with 705,172 reported deaths[3]. Notably, among the fatalities, there is a higher prevalence among older adults, classified as a high-risk group. This demographic exhibit increased vulnerability due to immunosenescence and the presence of multiple chronic conditions such as hypertension, cardiovascular diseases, and chronic respiratory illnesses, which exacerbate the severity of covid-19[4].

In this context, the adoption of preventive measures has become paramount, including hand hygiene, the use of hand sanitizer, wearing facial masks, practicing social distancing, and avoiding gatherings in public places or home events, with the purpose of mitigating the spread of covid-19. These measures remained crucial until the disease was brought under control, especially prior to the widespread implementation of vaccination[4].

All these precautions are deemed significant given the coronavirus's high propensity for mutations, leading to the emergence of new strains with varying degrees of virulence, potentially increasing the proportion of severe or lethal cases[4]. Furthermore, akin to the Influenza virus, it is believed that SARS-CoV-2 will persist within the population, causing sporadic outbreaks, possibly during seasonal periods[5].

The adoption of new behaviors takes into consideration the cultural context and individual characteristics that are intertwined with a specific community[6]. Studies have indicated a high adherence to preventive behaviors among the older population[7,8]. This adherence can be attributed to a preventive attitude stemming from the susceptibility and severity of the disease, as well as the influence of family, friends, and media[9-11]. Other conditions may indirectly influence health behavior adoption, including demographic, psychosocial, and structural factors[11]. One study demonstrated a greater adoption of preventive measures in older women with higher levels of education compared to men[12]. Additionally, a correlation was found between the fear of acquiring the pathogen and an increase in protective behaviors, particularly among older individuals with multimorbidity[12,13].

Given that the adoption of preventive measures against the virus spread is influenced by individual, familial, and social contexts, this study focused on investigating older adults participating in the Open University Program for the Older Adults (OUPOA). This cohort was selected as the research subject owing to their active social engagement, which implies a higher likelihood of embracing preventive behaviors.

This study will be pertinent to understanding the adoption of health behaviors among older adults and will also guide healthcare professionals in formulating effective educational strategies for enhanced adherence to health behaviors, demystifying beliefs and misconceptions regarding covid-19 protection measures.

Thus, the aim of this study was to delineate the profile of preventive behavior against covid-19 adopted by older adults and examine its correlation with social and health conditions.

METHOD

This is a cross-sectional and analytical study conducted with participants from an OUPOA in Campinas (SP). The OUPOA is a social program aimed at providing individuals (aged >50 years) from the university and municipal community with retirement preparation through the biannual provision of workshops, experiences, and lectures. The selection of this group is justified by their engagement in activities fostering health knowledge, the expansion of social connections for an improved quality of life, and the redefinition of the role of older adults in the community.

For sample size calculation, the G*Power 3.1.9.2 software was employed, assuming a significance level of 5%, test power of 80%, effect size of 0.15, and a 20% increment to account for potential losses, resulting in a minimum number of 66 participants. The inclusion criterion was an age equal to or greater than 60 years. Older adults who could not be reached by phone after three attempts on different days and times were excluded.

Data collection occurred through telephone calls between November 2020 and June 2021. A questionnaire comprising inquiries about demographic and socioeconomic aspects, health conditions, and topics related to covid-19 was administered during these calls. Trained interviewers conducted the interviews, which ranged in duration from 30 to 60 minutes.

During the data collection period, individuals were in social isolation, although there had been relaxations regarding the movement of people and businesses, as well as the commencement of covid-19 vaccination in January 2021[14].

The evaluated preventive measures against covid-19 included handwashing, avoiding social gatherings, wearing a facial mask, practicing social distancing, using hand sanitizer, avoiding supermarkets/pharmacies, practicing cough etiquette, exercising, avoiding going out/walking, coughing using a tissue, and wearing gloves. Each measure was described in terms of frequency (most of the time, sometimes, rarely, and never). Adoption of each measure was considered when the response was "most of the time," and non-adoption when responses were "sometimes," "rarely," or "never." Other variables in the study included:

• Sociodemographic characteristics: gender (female; male), age (<70 years; ≥70 years), living alone (yes; no), income (<4 minimum wages; 4 to 10 minimum wages; >10 minimum wages), education (≤12 years; >12 years);

• Health conditions: multimorbidity (reporting two or more diseases: hypertension, asthma, bronchitis or emphysema, diabetes, cardiovascular diseases, stroke, osteoporosis, musculoskeletal diseases, cancer, psychiatric disorders); polypharmacy (the use of five or more continuously used medications - yes; no) and self-reported fear and anxiety;

• covid-19 topics: exposure to covid-19 (suspected or confirmed case) and sources of information about the disease.

The data were entered into a virtual platform and analyzed using Stata software version 17.0 (StataCorp, College Station, United States; serial number 401706357306). The preventive behaviors for covid-19 were subjected to a principal component analysis to explore interdependence in multivariate data.

The Kaiser criterion was employed to determine the number of factors to be extracted, involving the selection of components with eigenvalues exceeding 1.00. To identify preventive behaviors, components with a factor loading greater than one and their explanatory variance were considered. Following component selection, only variables with factor loadings absolute values greater than 0.25 were included.

To test the association between covid-19 protection behaviors and social and health conditions, the Pearson chi-square test and Fisher's exact test were employed at a significance level of 5%.

The project obtained approval from the Ethics Committee, and ethical principles were followed in accordance with Resolution number 520/2016, as per opinion number 4,152,788/2020. All participants provided verbal authorization to participate in the study, thus confirming the Informed Consent Form[15].

DATA AVAILABILITY

The entire dataset supporting the results of this study is available upon request to the corresponding author, Isabella Risi Dias.

RESULTS

A total of 72 participants were assessed, with the most widely implemented preventive

measures against covid-19 being handwashing (97.2%) and avoiding social gatherings (97.1%) (Figure 1).

The Table 1 indicates the eigenvalues, the percentage of variance that each of the components represents, and the cumulative of these percentages.
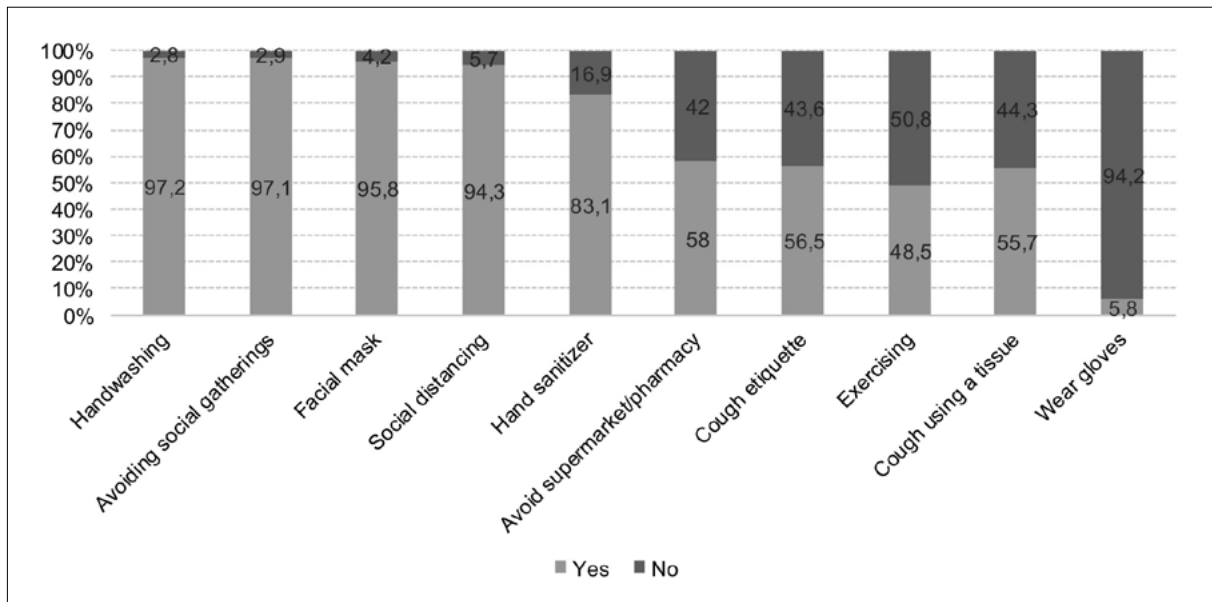
Figure 1. Distribution (%) of older adults according to the adoption of preventive measures (n=72). Campinas, São Paulo, 2020-2021.

Source: Authors. (2022).

Table 1. Eigenvalues and percentages of explained variance for the principal components (n=72). Campinas, São Paulo, 2020-2021.

Components	Eigenvalues	% Variance	% Cumulative
1	3.02	27.48	27.48
2	1.39	12.66	40.14
3	1.34	12.16	52.30
4	1,08	9.91	62.20
5	1.04	9.48	71.68
6	0.82	7.51	79.19
7	0.78	7.12	86.31
8	0.69	6.24	92.55
9	0.56	5.11	97.66
10	0.19	1.75	99.41
11	0.06	0.59	100.00

Source: Authors (2022).

Five components were considered for extraction due to their eigenvalues surpassing one. For each component, variables with factor loadings exceeding an absolute value of 0.25 were selected (Table 2). Subsequently, the following components were acknowledged:

- Component 1: Comprised five preventive behaviors, including handwashing, the use of hand sanitizer, facial mask usage, avoiding social gatherings and adherence to social distancing.

- Component 2: Encompassed the following preventive behaviors: handwashing, hand sanitizer use, facial mask usage, and avoiding social gatherings.

- Component 3: Enveloped four behaviors, namely handwashing, wear gloves, cough etiquette, and avoiding of supermarkets/pharmacies.

- Component 4: Involved the following behaviors: hand sanitizer use, coughing using a tissue, wear gloves, promoting social distancing, avoiding going out, and engaging in walking.

- Component 5: Constituted by behaviors such as hand sanitizer use, coughing using a tissue, wear gloves, and advocating for social distancing.

Due to its variance, component 1 was selected for the analysis of adherence to preventive measures. Therefore, older adults who reported frequently engaging in behaviors such as handwashing, using hand sanitizer, wearing a facial mask, avoiding social gatherings, and practicing social distancing were considered to have exhibited preventive behaviors against covid-19, totaling 79.2% of the sample (Table 3).

The majority of participants were female (81.9%), aged between 60 and 69 years (66.7%), with an education level equal to or higher than 12 years (80.9%), and an income of less than or equal to 10 minimum wages (80.9%). Regarding health, 50% of older adults reported having multimorbidity, and 18.1% mentioned the use of polypharmacy. There was a significant relationship between income and preventive behavior against covid-19 (p=0.038). Older adults with an income below four minimum wages showed higher proportions of preventive behavior (87.5%) compared to individuals with an income exceeding 10 minimum wages (46.2%) (Table 3).

Table 2. Factor loadings, adequacy measure, and uniqueness of preventive behaviors against covid-19. Campinas, São Paulo, 2020-2021 (n=72).

Preventive behaviors against covid-19	Factor loadings of preventive measures in each component					KMO per variable	Uniqueness measure
	1	2	3	4	5		
Handwashing	0.27	0.48	-0.31	0.08	-0.07	0.35	0.32
Hand sanitizer	0.28	-0.32	-0.15	0.38	0.35	0.34	0.30
Facial mask	0.42	-0.36	-0.03	0.12	-0.03	0,49	0.28
Cough etiquette	0.25	-0.06	0.42	0.21	0.12	0.59	0.50
Coughing using a tissue	0.04	0.40	0.25	-0.44	0.43	0.56	0.28
Wear gloves	0.05	0.18	0.36	0.28	-0.71	0.30	0.15
Avoiding social gatherings	0.52	0.26	-0.15	-0.16	-0.17	0.53	0.08
Social distancing	0.50	0.11	-0.23	-0.27	0.35	0.63	0.09
Avoid going out/ walking	0.16	0.06	0.30	0.46	-0.07	0.52	0.37
Avoid supermarkets/ pharmacies	0.24	0.06	0.53	-0.23	-0.01	0.60	0.37
Exercising	0.08	-0.22	0.24	-0.19	-0.08	0.60	0.36

Source: Authors (2022). * Kaiser-Meyer-Olkin (KMO) global test =0.51.

Table 3. Distribution (%) of older adults according to sociodemographic characteristics, health-related factors, topics related to covid-19, and adoption of preventive behavior during the pandemic (n=72). Campinas, São Paulo, 2020-2021.

Characteristics	Total n (%)	Preventive behavior		p-value
		Yes n(%)	No n(%)	
Gender				0.330
Female	59 (81.9)	48 (81.4)	11 (18.6)	
Male	13 (18.1)	9 (69.2)	4 (30.8)	
Age				0.218
< 70 years	48 (66.7)	40 (83.3)	8 (16.7)	
≥ 70 years	24 (33.3)	17 (70.8)	7 (29.2)	
Family structure				0.822
Single-person	27 (37.5)	21 (77.8)	6 (22.2)	
Multiperson	45 (62.5)	36 (80.0)	9 (20.0)	
Education (n=68)				0.400
≤ 12 years	13 (19.1)	9 (69.2)	4 (30.8)	
> 12 years	55 (80.9)	44 (80)	11 (20)	
Income (n=68)				0.038
< 4 minimum wages	24 (35.3)	21 (87.5)	3 (12.5)	
4 a 10 minimum wages	31 (45.6)	26 (83.9)	5 (16.1)	
>10 minimum wages	13 (19.1)	7 (46.2)	7 (53.8)	
Multimorbidity				0.772
Yes	36 (50.0)	28 (77.8)	8 (22.2)	
No	36 (50.0)	29 (80.6)	7 (19.4)	
Polypharmacy				0.330
Yes	13 (18.1)	9 (69.2)	4 (30.8)	
No	59 (81.9)	48 (81.4)	11 (18.6)	
Anxiety (n=71)				0.257
Yes	35 (49.3)	30 (85.7)	5 (14.3)	
No	36 (50.7)	27 (75)	9 (25.0)	
Fear of covid-19 (n=71)				0.840
Yes	62 (87.3)	50 (80.7)	12 (19.3)	
No	9 (12.7)	7 (77.8)	2 (22.20)	
Total		57 (79.2)	15 (20.8)	

Source: Authors (2022).

DISCUSSION

This study aimed to establish connections between social and health characteristics, as well as preventive behaviors against covid-19, among participants in an Open University Program for the Older Adults (OUPOA). It is noteworthy that the majority of the older adults were female, in their sixties, with a high level of education and an income ranging from four to 10 minimum wages. This predominantly female profile aligns with other studies, emphasizing the feminization of old age and an increasing focus on this segment that ages differently in both biological and psychosocial aspects[16-18].

Regarding education and income, the results presented diverge from those presented by the ELSI initiative, which encompasses a sample of older adults from the Brazilian population. Probably, because the older adults participating in the OUPOA program are likely to have higher education and incentives to engage in lifelong learning initiatives[11,13, 19, 20].

Concerning health conditions, the majority of participants exhibited multimorbidity and fear of covid-19. These topics were prevalent in this population due to the perceived susceptibility to contracting the disease caused by the immunosenescence process[7,8].

Additionally, there is the challenge of obtaining information and evidence regarding covid-19, particularly in the early stages of the pandemic[12]. Nevertheless, the OUPOA contribute to the maintenance of social participation among the older adult, potentially fostering a positive perception of well-being and health. Such initiatives also assist in building support networks and promoting individual integration, facilitating the adoption of preventive health behaviors[21,22]. Amid the covid-19 pandemic, the University established a support network for the older adult through telephone calls, enabling them to share their concerns and maintain an active support system. This program proved essential for health promotion and the strengthening of bonds with the older adult during the covid-19 period[23].

In this study, the adoption of preventive behaviors was assessed through the reporting of care practices such as handwashing, avoiding social gatherings, wearing facial masks, practicing social distancing, and utilizing hand sanitizer. The modes of coronavirus transmission include person-to-person through infected droplets, saliva, or aerosols, as well as via contact with objects and surfaces contaminated with the virus[24]. Handwashing with soap and water, along with the use of hand sanitizer, are indispensable measures, as they not only prevent environmental contamination in case an individual is infected but also serve to prevent infection when coming into indirect contact with secretions/aerosols[25]. This strategy is easily comprehensible, has been extensively covered in major media outlets, and encourages the utilization of basic hygiene resources such as soap and water for its implementation.

Regarding the use of face masks, numerous studies have addressed their efficacy as a barrier method that prevents and reduces the dispersion of the virus in the environment, consequently lowering the incidence of cases in a pandemic and emergency situation. With the onset of the disease, there was an intense global demand for masks. In this context, in addition to surgical masks, cloth masks also emerged, varying in the number of layers. These had a direct impact on viral transmission, effectively slowing its dissemination[26,27].

Another effective measure, social distancing, ensured greater isolation among people by creating physical barriers or establishing significant safety distances, thus mitigating virus transmission[27]. In Brazil, since the onset of covid-19, various forms of isolation have been implemented, ranging from the suspension of events and restrictions on public spaces to population-wide quarantine (lockdown). This isolation must be long enough to guarantee the desired epidemiological effect; the early adoption of distancing measures can lead to a relaxation that allows for new waves of infection, as observed in Brazil[1,28]. A study conducted in the United States showed that 62.2% of the sample used facial masks, and 87.7% avoided large gatherings[24]. Conversely, in Hong Kong, China, 94.2% used facial masks[1,29].

These elevated adherence rates may indicate that the perception of the disease, based on knowledge and beliefs about it, as well as cultural and individual characteristics influencing the adoption or non-adoption of protective behaviors, alters preventive behaviors in general across all age groups[7,24].

Vaccination was not assessed as it was approved in the country after the commencement of this study. Several vaccines were developed during the pandemic, proving to be an effective preventive measure against coronavirus infection. Mass vaccination of the population establishes herd immunity and contains the spread of the pathogen[30].

The engagement of older individuals in preventive behaviors can be triggered by a complex combination of constructs such as barriers, social contexts, scientific dissemination, and personal perceptions/beliefs[4,7,19,29]. The adoption of preventive behaviors related to covid-19 was approximately

80% in this study. Studies indicate that compliance with preventive behaviors is associated with the perception of susceptibility to contracting covid-19 and its severity[7,8,22,31,32].

A study conducted in Singapore, aiming to analyze the relationship between sociodemographic data and preventive behaviors, included a sample of 953 individuals, with 65.1% being female, 8.1% aged 60 or older. Approximately 97% adopted at least one preventive measure, with around 95% of women frequently washing their hands, while about 80% of men did the same[33]. In Hong Kong, China, a study evaluated the community's efforts to adopt preventive behaviors in a sample of 765 individuals, where 18.7% were over 65 years old. Results showed that 97.4% used face masks, and 80.4% avoiding social gatherings[29].

The perception of severity was high among older individuals, as they recognize their immune system as more compromised and the risks associated with age-related comorbidities, leading them to adopt preventive measures more actively[8]. Noteworthy among the participants is the reported high level of education. It is known that individuals with higher educational attainment tend to exhibit greater adherence to preventive behaviors[34]. This phenomenon can be justified by their access to and understanding of information about the disease and its severity, motivating the utilization of preventive measures for self-protection[29].

In this study, a significant relationship was found between income and preventive behavior against covid-19. Individuals with an income exceeding 10 minimum wages adopted fewer preventive behaviors (46.2%) compared to those with lower income. This finding is similar to a Chinese study that identified a significant interaction between average versus below-average family income and precautionary behaviors. The study observed that lower income was associated with higher adoption, as individuals had less information and more fear of contracting the disease[9]. Another hypothesis for this finding may be linked to the fact that older adults with higher incomes did not need to expose themselves by leaving home for work or travel, resulting in less use of personal protective equipment.

Among the limitations of this study is the fact that the data were self-reported, allowing for potential manipulation by the participants. During the pandemic, some studies acknowledged self-reported accounts of adopting preventive behaviors as a limitation, as individuals tend to conform to socially acceptable behavioral norms, potentially overestimating the adoption of preventive measures[33,35].

However, it is important to note that the participants in this study are individuals with higher education and income who attend a university. Consequently, they may have easier access to information about covid-19 and non-pharmacological behaviors to be adopted during this period. Additionally, the sample was specific to an OUPOA, which prevents the extrapolation of study findings to the older population in the municipality of Campinas. Further studies with probabilistic sampling are necessary to provide more generalizable insights.

CONCLUSION

The results of this study revealed that the older participants from the OUPOA adhered to preventive measures for covid-19. The majority reported engaging in behaviors such as hand hygiene with soap and water or hand sanitizer, wearing facial masks, practicing social distancing, and avoiding social gatherings.

Another noteworthy finding was the significant association between income and the adoption of these preventive behaviors. Individuals with incomes below four minimum wages showed higher proportions of adopting preventive measures, indicating that socioeconomic factors play a crucial role in adherence to these practices.

In light of the understanding that promoting preventive health behaviors depends not only on individual choices and characteristics but also on the social context in which these individuals are situated, this study reinforced that programs like this serve as potent social instruments for the socialization of older individuals, as well as for the dissemination of knowledge. Furthermore, it emphasizes the importance of directing educational and awareness

efforts toward higher-income groups, which may be less inclined to adhere to preventive measures.

Therefore, further research endeavors may prove crucial in seeking a heightened understanding of the factors influencing preventive behavior across diverse social and demographic groups. These studies can play a pivotal role in guiding public health strategies and educational initiatives for covid-19 prevention among the older population.

AUTHORSHIP

- Isabella R. Dias - Paper writing; critical review; data analysis and interpretation; approval of the version to be published; responsibility for all aspects of the manuscript, ensuring issues related to the accuracy or integrity of any part of the work.

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- Daniella P. Nunes - Paper writing; critical review; conception, design, analysis and interpretation of data; approval of the version to be published; responsibility for all aspects of the manuscript, ensuring issues related to the accuracy or integrity of any part of the work.

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