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Contents

EDITORIAL

CARE FOR OLDER ADULTS IN TIMES OF PANDEMIC
Celia Pereira Caldas

ORIGINAL ARTICLES

SMARTPHONE USAGE TIME AND RELATED HEALTH CONDITIONS IN OLDER PEOPLE DURING THE COVID-19 PANDEMIC
Ana Paula Vasconcellos Abdon, Monike Couras Del Vecchio Barros, Camila Cristine Tavares Abreu, Thais Nogueira Falcão, João Gabriel de Oliveira e Sousa, Daniela Gardano Bucharles Mont'Alverne

COVID-19 INFODEMIC ON OLDER PEOPLE WITH ACCESS TO DIGITAL MEDIA: FACTORS ASSOCIATED WITH PSYCHOPATHOLOGICAL ALTERATIONS
Elisa Shizuê Kitamura, Ricardo Bezerra Cavalcante, Edna Aparecida Barbosa de Castro, Isabel Cristina Gonçalves Leite

HEADACHE IN BRAZILIAN OLDER PEOPLE IN THE CONTEXT OF COVID-19 INFODEMIC
Camila Mello dos Santos, Karla Frichembruder, Marina Bittelbrunn Severo, Gabriela Hammes Gehrke, Ricardo Bezerra Cavalcante, Alexandre Fávero Bulgarelli

DEPRESSIVE SYMPTOMS AND ASSOCIATED FACTORS IN OLDER PEOPLE DURING THE COVID-19 PANDEMIC IN THE CITY OF SÃO PAULO-SP
Jack Roberto Silva Fhon, Priscila Conceição da Costa, Tatiane Santos Cardoso, Eveline Fontes Costa Lima, Vilanice Alves de Araújo Püschel

VULNERABILITY OF INSTITUTIONALIZED ELDERLY PEOPLE AND SOCIAL SUPPORT IN THE PERSPECTIVE OF THE COVID-19 PANDEMIC
Andiara Araújo Cunegundes de Brito, Jennifer do Vale e Silva, Júlia Maria Fernandes Holanda, Ryssia Raynalle Magalhães Nogueira de Souza, Tamires Carneiro de Oliveira Mendes, Kenio Costa Lima

EFFECTS OF REMOTE HOME-BASED EXERCISE PROGRAM ON FUNCTIONAL CAPACITY AND PERCEIVED LONELINESS IN OLDER ADULTS DURING COVID-19 LOCKDOWN
Francisco Luciano Pontes Júnior, Rodrigo Villar, Gabriela Ferreira dos Santos, Anderson Saranz Zago, Thomas Beltrame, Danilo Sales Bocalini

EXPOSURE TO INSUFFICIENT LEVELS OF PHYSICAL EXERCISES AMONG OLDER ADULTS DURING PHYSICAL DISTANCING AS A RESULT OF COVID-19
Fabiana Medeiros de Almeida Silva, Marisete Peralta Safons

INCIDENCE OF FRAILTY AND FACTORS ASSOCIATED WITH FUNCTIONAL DETERIORATION IN OLDEST OLD DURING THE COVID-19 PANDEMIC: A COHORT STUDY
Marcelle Ferreira Saldanha, Egdar Nunes de Moraes, Rodrigo Ribeiro dos Santos, Ann Kristine Jansen

SOCIAL SUPPORT AND FAMILY FUNCTIONING: A CROSS-SECTIONAL STUDY OF OLDER PEOPLE IN THE CONTEXT OF COVID-19
Vitória Rocha Janhaque, Ana Luiza Blanco, Ariene Angelini dos Santos-Orlandi, Tábatta Renata Pereira de Brito, Daniella Pires Nunes

Care for older adults in times of pandemic

The emergence of the COVID-19 pandemic has brought challenges that have impacted direct care to people at all levels of health care. Among these challenges is the redefinition of care for older adults. The development of the capacity for self-care has emerged as fundamental in these times of pandemic.

In the aging process, self-care can be characterized by the actions that people perform in their daily lives to prevent, control or reduce the impact of chronic conditions on their own health[1]. While health team interventions to help people qualify this process are characterized as supported self-care.[2]

The capacity to understand the actions required to maintain health and the ability to persist with healthy behaviors are aspects that influence health behavior. During the pandemic, we learned that programs aimed at the care and health promotion of individual older adults should offer self-care support systems that include educational and rehabilitation actions, so that even older adults with some degree of dependence have the opportunity to strengthen their intrinsic functional capacity.[3] Programs aimed at promoting intrinsic capacity should strengthen these individuals' self-concept, self-efficacy and control over their own lives. In addition, such programs should promote good family relationships and social support.

For an independent life in old age, material resources and social support services are required. Gabardo-Martins et al.[4] indicate that one of the most important dimensions of social support is access to information, so that people are able to solve their problems autonomously. However, older adults must have the ability to give and receive affection, to develop empathy and to trust other people. Thus, Gabardo-Martins *et al.*[4] also reinforce the importance of relationships capable of helping the person to assess how they conduct their own life. When older adults have access to social support with such qualities, they will maintain the feeling of belonging and self-care, even during periods of social distancing. In this case, social distancing will not mean social isolation.[3]

In addition to aspects related to supported self-care and social support, care for older adults involves several issues that became more evident with the emergence of the pandemic. In order to face such challenges, reflection based on science is necessary and urgent, since actions without adequate scientific depth often result in irrational empiricism.

This thematic issue of RBGG is expected to contribute to the care of older adults in times of pandemic. The intention is to discuss and propose solutions that minimize the impacts of the pandemic on the quality of life and health of the older adult population, based on scientific knowledge.

Thus, the scope of this thematic edition encourages articles that address:

• The demands of care for older adults in different contexts (long-stay institutions; the home; hospital; primary health care) in times of pandemic;

• The organization of the health service network for these new demands;

• Possible responses to the challenge of meeting these demands;

• The mental health of older adults in a context of social distance;

• The impact of social inequalities in the care of older adults in times of pandemic;

• The training of caregivers and family members of older adults for this new reality.

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Original Articles

1 of 13

Smartphone usage time and related health conditions in older people during the COVID-19 pandemic

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Abstract

Objective: To evaluate smartphone usage time and related health conditions in older people during the COVID-19 pandemic. *Method*: This is a cross-sectional study of 237 older people (aged ≥60 years) Brazilians, carried out between June and August 2020. An online form was used to obtain the following variables: socio-economic profile, health status, and smartphone usage. Bivariate and multivariate analyzes were performed using the SPSS program with the outcome of smartphone usage time. *Results*: Of the study individuals, 69.2% (n=164) were females, 48.5% (n=115) complained of cervical pain, 57.4% (n=136) had a cervical disability and remained 6.2 hours a day in the sitting position per week. Approximately 54.4% (n=129) reported increased smartphone usage in the past few months, reporting 4.2 hours of usage/day. Younger senior individuals (p=0.038), who did not practice physical activities (p=0.001), with good health assessment (p=0.009) and who spent more extended periods in the sitting position (p=0.011) spent more time using the device. *Conclusion*: Considering the smartphone usage during the COVID-19 pandemic associated with more extended periods in the sitting position and a sedentary lifestyle, it is worth mentioning its adverse effects on the physical and mental health of older people.

INTRODUCTION

The first case of Corona Virus Disease-19 (COVID-19) was reported in Wuhan, China, on December 31, 2019 and was declared a World Pandemic on March 11, 2020, accounting for more than 13,673,507 confirmed cases and 361,884 deaths in Brazil as of April 14, 2021[1]. The uncontrolled spread of COVID-19 caused worldwide fear. For older people and people with some type of comorbidity, the risk of death is high[2].

With regard to combat measures, biologists, infectologists and other researchers have dedicated themselves to understanding COVID-19, seeking effective clinical treatments and the discovery of vaccines to control it. Meanwhile, measures to prevent infection of the disease were adopted, such as flexible or rigid social isolation (*lockdown*)[3].

The use of technologies was one of the strategies used to minimize/mitigate the effects of social isolation on the biopsychosocial aspects of the population in general[4]. In the older population, digital inclusion is part of social inclusion, contributing to active aging, since social relationships influence their social role and, consequently, their self-esteem. Socialization takes place beyond physical contact, incorporating interactive systems, such as information, communication and connectivity technologies, which expands the acquisition of information[5].

Since its inception at the beginning of the 21st century, the smartphone has become ubiquitous in everyday life, with approximately five billion users worldwide, due to the diversity of functions offered and the merger with the Internet[6]. In the world there are more than five billion mobile phone users and more than four billion internet users. In Brazil, 94% of the population has a smartphone, with a density of 108 devices/100 inhab. In the world ranking, the country ranks second in time spent on the internet and time spent on the smartphone using the internet[7].

According to the Brazilian Institute of Geography and Statistics (IBGE), 45% of people over 60 were connected to the Internet in 2019, highlighting the increase in the number of older people with access to the network compared to 2018, which was 38.7%, with the smartphone being the main means of access[8]. Furthermore, the view of old age and the way of living it has changed dramatically in the last 30 years. Currently, the figure of the older person as an outstanding character in the social scenario appears quite differently when compared to previous periods of history, which was characterized by experiences related to conditions of "abandonment, isolation and social neglect"[9].

There is a diversity of opportunities in the technological engagement of this older population, whether for video calls or online surveys, for searching for movies or even for virtual shopping. Resources are present in everyone's life, technological possibilities are increasingly within reach. However, it is important to know how to handle applications using languages that are not always accessible to this population[10]. The Statute for the Older Person[11], found in Art. 21, § 1st, states that special courses for older people include content related to communication techniques, computing and other technological advances, for their integration into modern life, making them an achievable challenge.

However, it is known that excessive smartphone use can have negative consequences for physical, mental health and interpersonal relationships, highlighting musculoskeletal changes, vision problems, increased levels of aggression, as well as a high risk for development of psychopathologies[12]. Monitoring smartphone usage time in the general population should be encouraged as it is a predictor of dependence on this mobile device[13].

Faced with isolation as a preventive measure of COVID-19, the population resorted to the use of the smartphone as a communication strategy, obtaining information, shopping and approaching their families. This change impacted the time of use of this device by this population. Therefore, research that assesses excessive use by monitoring time can contribute to the discussion on associated factors and health hazards. Despite the importance of the theme, existing research focuses on the young population, and it is important to deepen studies on smartphone use and possible negative repercussions on other groups and age groups, especially during and after the COVID-19 pandemic.

Thus, this study aimed to assess smartphone usage time and related health conditions in older people during the COVID-19 pandemic.

METHOD

This is a quantitative, cross-sectional and analytical study, arising from the umbrella project entitled "Relationship between musculoskeletal dysfunction of the cervical region and smartphone use by older people during the COVID-19 pandemic", carried out throughout the national territory.

The period of recruitment and data collection took place from June to August 2020. During this period, the Brazilian population was in social isolation for more than three months, adopted by the Ministry of Health as a measure to combat the pandemic through Ordinance No. 356/20 and Law 13,979/20, and by the specific decrees of each State.

A total of 237 healthy older people (≥ 60 years) participated in the study, regardless of demographic characteristics and who used the smartphone routinely. Such amount was estimated by sample calculation, based on the amount of the older population (n=28,000,000) in the country, prevalence of 18% of neck pain in mobile device users[14], sample precision of 5% and confidence interval of 95%. The exclusion criteria adopted were diagnoses of fractures in the spine region, head or neck surgeries, congenital deformities, advanced stage neuromuscular diseases, and self-reported senile dementia during recruitment. 22 questionnaires were removed due to duplicity of answers, from the verification by a specific tool of the statistical program.

The recruitment of participants was carried out using the *snowball* method and through an online message through the Whatsapp platform and social networks, promoting greater dynamism and speed of feedback. This method consists of a sampling technique performed with the objective of gaining access to hard-to-reach and/or hidden populations[15]. The starting point of this recruitment was a group of older professors from a higher education institution who received the link to access the consent form and the electronic form, passing the same link to other older people they knew. It is worth mentioning that

the information about the inclusion and exclusion criteria were explained in the invitations and in the free and informed consent form (ICF).

After authorization, the participants were submitted to data collection by completing the Google Forms electronic form, with an average duration of 15 minutes to be answered, containing the following parts: 1st part - socioeconomic profile, 2nd part - health conditions during the pandemic, 3rd part - functional disability in the cervical region by the Neck Disability Index (NDI-BR) and 4th part - smartphone usage time by the Smartphone Addiction Inventory (SPAI-BR).

In this study, as it is a reduction, the following variables of the socioeconomic profile were used (age, sex, marital status, education and social class by minimum wage range), health conditions during the pandemic (physical activity, smoking, alcohol consumption in the last thirty days, good sleep/hours of sleep, diagnosis of COVID-19, symptoms related to COVID-19, complaint of neck pain/pain intensity, general health assessment, sitting time per weekday and weekend). This part of the form was prepared based on the National Health Survey, carried out by the Brazilian Institute of Geography and Statistics (IBGE).

Pain intensity was assessed using the Visual Analogue Scale (VAS) which consists of a 10 cm long horizontal line, with two descriptors referring to pain at its ends (0 being no pain and 10 being severe pain). A VAS figure was included in the form to guide them, and the participant was asked to mark the value of pain intensity in the last months. The classification adopted was mild (1-3), moderate (4-6) and severe (7-10)[16].

Functional disability in the cervical region was investigated by the NDI-BR. This instrument, adapted and validated for Portuguese, has 10 items to assess functional disability, with six response options ranging from zero (0) to five (5)[17]. To obtain the total score of the instrument, the sum of the responses of all items was made. In this study, a dichotomous classification was used: absence (≤4 points) and presence of functional disability in the cervical region (>4 points)[18].

The Smartphone Addiction Inventory (SPAI-BR), validated and adapted to Portuguese, is a questionnaire with 26 items with a yes (1) and no (0) answer that aims to assess smartphone addiction[19]. In the present study, only the questions regarding the time of use were analyzed: 1) I have been told more than once that I spend too much time on the smartphone; 2) I think I have been more and more time connected to the smartphone; 3) I have considerably increased the time spent using the smartphone in the last 3 months; and 4) I've been trying to spend less time using my smartphone, but I haven't been able to. In addition to these, two questions were added regarding the time of use in hours/day and use for work.

Data were analyzed using descriptive and inferential statistics. In the descriptive analysis, categorical variables were presented as absolute (n) and relative (%) frequencies, and numerical variables were presented as mean ± standard deviation (SD). In the inferential analysis, the time of smartphone use was established as an outcome variable. Variables were also created from the existing ones for better statistical understanding, as follows: 1) general health assessment in: good (very good and good) and bad/regular (very bad, bad and regular) and 2) alcohol consumption in the last thirty days: no and yes (yes, up to 3 doses and yes, four doses or more).

Pearson's correlation test was used to analyze the relationships between the outcome and numerical variables, and for categorical variables, t and ANOVA tests were used. These parametric tests were in agreement with the Kolmogorov-Smirnov (KS) normality test. Then, multiple linear regression was applied, using the stepwise method, initially selecting the analyzes with $p<0.020$ in the bivariate to enter the model, allowing the identification of confounding variables. For the final model, only the variables with a significance of 5% remained, and adjusted correlations (β) were calculated. Furthermore, the chi-square test was used followed by the calculation of the measure of association to verify the relationship between the variable pain and functional disability in the cervical region. For all analyses, SPSS Statistics version 23.0 was used.

This study was approved by the ethics committee of the University of Fortaleza, with opinion nº. 4,060,750, according to Resolutions 466/12 and 510/16 of the National Health Council. All participants marked the item "I have read and I want to participate in the research" at the end of the free and informed consent form (ICF) as a condition for, consequently, being referred to the electronic form.

RESULTS

Of the total number of participants, the mean age was 66 years (± 6.3), 164 (69.2%) were female, 145 (61.2%) were married, 177 (74.7%) had higher education and 85 (35.9%) belonged to social class B (Table 1). Regarding the regions of the country, 2 (0.8%) were from the North region, 209 (88.2%) from the Northeast region, 6 (2.5%) from the Midwest, 16 (6.8%) from the Southeast and 4 (1.7%) from the South region.

Regarding health conditions during the COVID-19 pandemic, 56.1% (n=133) did not practice physical activity, 48.9% (n=116) were former smokers, 38.8% (n=92) had consumed alcohol in the last thirty days, 32.5% (n=77) did not sleep well and had an average sleep time of 6.7 (±.5) hours. In continuity, 4.2% (n=10) were diagnosed with COVID-19, 16.9% (n=40) reported symptoms related to COVID-19 and 46.8% (n=111) rated their health as good (Table 2).

Regarding the cervical region, 48.5% (n=115) reported a complaint of pain in this region during the pandemic and in 57.4% (n=136) the presence of functional disability in the cervical region was found (Table 2). An association between these two variables was also observed, with pain complaints being five times more frequent in older people with the presence of functional disability (OR=5.94; $p<0.001$).

Regarding smartphone use, 42.2% (n=101) reported spending too much time on the device according to other people, 54.4% (n=129) declared a considerable increase in usage time in the last 3 months and 48.1% (n=114) were using it for work (Table 2). Regarding the self-reported time of smartphone use, they spent an average of 4.2 (± 2.8) hours/day, remained seated for 6.2 (±2.6) hours a day during the week and 6.4 (±2. 9) hours a day during the weekend.

Table 1. Distribution of the socioeconomic profile of older people during the Corona Virus Disease-19 (covid-19) pandemic. Brazil, 2020.

Variables	n (%)	Mean (DS)
Age		66.6 (6.3)
Sex		
Male	73 (30.8)	
Female	164 (69.2)	
Marital status		
Single	26 (11.0)	
Married	145 (61.2)	
Divorced	33 (13.9)	
Widowed	20 (8.4)	
Separated	13 (5.5)	
Education		
Elementary school	15 (6.3)	
High school	45 (19.0)	
College	177 (74.7)	
Social class by minimum wage range*		
A (> 20 MW)	35 (14.8)	
B (> 10 a ≤ 20 MW)	85 (35.9)	
C (> 4 a ≤ 10 MW)	60 (25.3)	
D (>2 a ≤ 4 MW)	37 (15.6)	
E (≤ 2 MW)	20 (8.4)	

n: absolute value; %: percentage; SD: standard deviation.

Table 2. Distribution of variables related to health conditions and time of smartphone use of older people during the Corona Virus Disease-19 (covid-19) pandemic. Brazil, 2020.

Variables	n (%)
Physical activity during the pandemic	
Yes	104 (43.9)
No	133 (56.1)
Smoking	
Smoker	7 (3.0)
Ex smoker	116 (48.9)
Never smoker	114 (48.1)
Alcohol consumption in the last thirty days*	
No	145 (61.2)
Yes	92 (38.8)
Good sleep during the pandemic	
Yes	160 (67.5)
No	77 (32.5)

to be continued

Continuation of Table 2

Variables	n (%)
Diagnosis of COVID-19	
No	227 (95.8)
Yes	10 (4.2)
Symptoms related to COVID-19	
No	197 (83.1)
Yes	40 (16.9)
General health assessment during the pandemic	
Very bad	4 (1.7)
Regular	54 (22.8)
Good	111 (46.8)
Very good	68 (28.7)
Complaint of neck pain	
No	122 (51.5)
Yes	115 (48.5)
Pain intensity (n=115)	
Mild	24 (20.9)
Moderate	59 (51.3)
Severe	32 (27.8)
Functional disability in the cervical region	
Absence	101 (42.6)
Presence	136 (57.4)
Smartphone use	
I have been told more than once that I spend too much time on the smartphone	100 (42.2)
I think I have been more and more time connected to the smartphone	129 (54.4)
I have considerably increased the time spent using the smartphone in the last 3 months	129 (54.4)
I've been trying to spend less time using my smartphone, but I haven't been able to	41 (17.3)
Smartphone use for work	114 (48.1)

n: absolute value; %: percentage. * number of doses on the same occasion.

In the bivariate analysis having the time of smartphone use as an outcome, an inversely proportional correlation was found between the time of use and age (r=-0.175; p=0.007). A directly proportional correlation was also identified between the time spent using the smartphone and the time sitting per day in the week (r=0.204; p=0.002) (Table 3).

In the follow-up, it was found that older people who did not practice physical activity (4.6±3.2) spent more time using the smartphone than those who did (3.7±2.1). On the other hand, those who rated their health as good (4.4±3.0 hours) spent an hour longer using the device compared to those who rated their health as bad (3.5±2.0 hours) (p=0.009) (Table 4). In the multivariate analysis, the younger seniors (p=0.038), non-practitioners of physical activity (p=0.001), with a good health assessment (p=0.009) and more time sitting per day in the week (p=0.011) remained using the smartphone for longer (Table 5).

Table 3. Correlation between the time of smartphone use by older people with related health conditions during the Corona Virus Disease-19 (covid-19) pandemic. Brazil, 2020.

Health conditions	Time of smartphone use	
	r	p-value
Age	-0.175	0.007*
Hours of sleep during the pandemic	0.041	0.535
Pain intensity (n=115)	0.066	0.482
Sitting time per weekday during the pandemic	0.204	0.002*
Sitting time per weekend during the pandemic	0.099	0.133

r= Pearson's correlation. *p<0.05.

Table 4. Bivariate analysis between the time of smartphone use by older people and health conditions during the Corona Virus Disease-19 pandemic (covid-19). Brazil, 2020.

Health conditions	Time of smartphone use	p-value
Sex		0.282
Male	4.5 ± 3.1	
Female	4.1 ± 2.7	
Marital status		0.560
Married	4.3 ± 2.9	
Divorced	4.6 ± 3.4	
Widowed	3.7 ± 2.3	
Single	3.5 ± 1.7	
Separated	4.4 ± 2.5	
Education		0.051
Elementary school	2.5 ± 1.1	
High scholl	4.0 ± 2.7	
College	4.4 ± 2.9	
Physical activity during the pandemic		0.011*
Yes	3.7 ± 2.1	
No	4.6 ± 3.2	
Smoking		0.133
Never smoker	4.3 ± 3.1	
Ex smoker	3.9 ± 2.2	
Smoker	6.0 ± 5.5	
Alcohol consumption in the last thirty days*		0.103
No	3.9 ± 2.7	
Yes	4.6 ± 2.9	
Good sleep duraing the pandemic		0.388
Yes	4.1 ± 2.9	
No	4.4 ± 2.7	
General health assessment during the pandemic		0.009*
Good	4.4 ± 3.0	
Very bad/regular	3.5 ± 2.0	

to be continued

Continuation of Table 4

Health conditions	Time of smartphone use	p-value
Complaint of neck pain during the pandemic		0.210
Yes	4.0 ± 2.5	
No	4.4 ± 3.1	
Functional disability in the cervical region		0.517
Ausence	4.3 ± 3.0	
Presence	4.1 ± 2.6	
Smartphone use for work		0.128
Yes	4.5 ± 2.9	
No	3.9 ± 2.8	

*$p < 0.05$.

Table 5. Multivariate analysis between the time of smartphone use by older people and related health conditions during the Corona Virus Disease-19 pandemic (covid-19). Brazil, 2020.

Variables	β	95% IC	p-value
Age	-0.065	-0.126 - -0.004	0.038*
Education	0.340	-0.354 - 1.034	0.069
Physical activity during the pandemic	1.305	0.567 - 2.043	0.001*
Smoking	-0.226	-0.870 - 0.417	0.489
Alcohol consumption in the last thirty days	0.247	-0.516 - 1.010	0.525
General health assessment during the pandemic	-1.178	-2.055 - -0.302	0.009*
Smartphone use for work	0.043	-0.754 - 0.841	0.915
Sitting time per weekday during the pandemic	0.233	0.053 - 0.413	0.011*
Sitting time per weekend during the pandemic	-0.044	-0.201 - 0.113	0.580

95% IC=95% confidence interval. β: adjusted Pearson's correlation. *$p < 0.05$, variables in the final model by multivariate linear regression.

DISCUSSION

During social isolation, the use of smartphones by older people was mainly caused by video calls, which helped them stay connected during the pandemic, expanding the social circle or intensifying the frequency of contact with their family and friends[20]. Various applications favored the maintenance of physical and mental health, consultations with specialists and household organization. However, some older people have difficulty using some of these tools, needing help in choosing and using them[4].

In recent years, the older portion of society needed to learn to deal with the internet, social networks, smartphones, tablets and computers to be socially inserted. Unlike generations X and Y, whose contact with technology occurs early, older people generally face obstacles to their digital insertion[21]. This fact may justify the scarcity of studies regarding the excessive use of smartphones by this age group.

Regarding the health conditions during the COVID-19 pandemic investigated in the present study, a significant portion of the sample did not practice physical activity, spent more than 6 hours sitting, did not consume alcohol recently and did not sleep well, with less than 8 hours/night. Despite this, older people rated their health as good. Regarding these findings, it is known that alcoholism, smoking, physical inactivity and impaired quality/hours of sleep would be responsible for numerous chronic diseases and negative repercussions on the physical and mental health of older people[22].

The COVID-19 pandemic has also caused changes in health behaviors, interfering with physical activity, alcohol intake and sleep. In particular for the practice of physical activity, since March 2020 social isolation has made the usual places for the practice of physical activities, such as gyms and outdoor recreation in various parts of the world, inaccessible. In this regard, a French study through an online survey involving different age groups showed a reduction in levels of physical activity, an increase in sitting and screen time by the older people in the sample[23]. These results together indicate that rigid or flexible social isolation caused changes in lifestyle, favoring a decrease in physical activity and an increase in sedentary lifestyle.

Regarding alcohol consumption, Stanton et al.[24] found an increase in alcohol intake among Australian adults and older people during the period of social isolation. According to the authors, stress, unemployment, and uncertainty about the future can lead to neuro-adaptations that exacerbate impulses for alcohol intake[24]. Another UK study of adults and older people found a 17% increase in alcohol consumption after strict social isolation or lockdown, in addition to an association with depression and compromised mental health and well-being[25].

Continuing with the findings on sleep, Barros et al.[26] showed an increase in the incidence and prevalence of sleep disorders among Brazilian adults and older people during the COVID-19 pandemic. According to the authors, poor sleep quality can affect mental health, leading to depression and anxiety in older people, potentiated in the period of social isolation[26]. Allied to this, it is known that excessive smartphone use also causes changes in the hours and quality of sleep in adults and older people[27].

Pain and functional disability in the cervical region were the musculoskeletal variables investigated, complementing the assessment of physical health in the present study. A high percentage of the sample reported complaints of neck pain during the pandemic and the presence of functional disability in the cervical region, detected by a specific instrument. In addition, pain complaints were five times more prevalent in older people with functional disability. Pain is a prevalent disorder worldwide, causing

suffering, functional limitation and a deleterious effect on quality of life. Most chronic pain conditions occur in older people and are musculoskeletal in nature, such as pain in the lower back, neck, and joints. People with chronic pain more often have anxiety, depression, catastrophizing and suicidal ideation, which are likely to be exacerbated in times of stress such as the pandemic[28].

There are still few studies involving pain in this current context. Fallon et al.[29] verified in a study in the United Kingdom that participants with chronic pain reported increased pain severity, associated with reports of anxiety and depression; and reduced levels of physical activity. The presence of catastrophizing was also detected in the sample. Based on this, the authors suggest specific actions aimed at managing pain and encouraging the practice of physical activity, seeking to minimize the adverse effects in periods of social isolation[29].

In the present study, it was found that older people have been continuously using the smartphone for a long time. A high percentage of the sample stated an increase in the time of use in the last three months, self-declared an average of 4h12min per day. There was a perception on the part of other people that the older people were spending too much time using the smartphone. Insufficient amount of studies on the time of use of this device by older people before the pandemic makes it difficult to understand its influence on the increase in the time of use. However, recent international surveys placed Brazilians in 2nd place in time spent on the internet, spending more than 10h 8 min connected per day and in 2nd place in time spent on the internet using a cell phone, spending on average more than 5h 17 min connected per day. It is known that the world average is 3 hours and 39 minutes per day, with this, it was observed that Brazil uses 2 hours more[7].

The increase in hours of use constituted a potential risk factor for problematic smartphone use[30], with the possibility of having a negative impact on the physical and mental health of older people. Studies warn that this excess can resemble an addiction, being used for longer than intended or perceived by the user[31]. In addition, spending more than three hours a day can be considered a strong indicator of dependence[13]. This can also be associated with poor sleep quality[31]

and postural changes, such as text neck[14]. In this incorrect posture, the user moves the neck forward and down, with protrusion and internal rotation of the shoulders when using the smartphone. This can cause injuries to the osteoarticular structure of the cervical spine, upper limbs and, consequently, pain in the region[32].

Regarding related health conditions, younger seniors, who did not practice physical activity, had a good health assessment and spent more time seated, spent more time using their smartphone. These findings strengthen the evidence that sedentary behavior is related to screen time, involving the use of computers, tablets, smartphones and others. Meyer et al.[33] revealed a reduction in the practice of physical activity and an increase in sitting time associated with an increase in screen time during social isolation compared to the previous period in people aged 17 to 75 years or older[33].

Regarding the relationship between a general assessment of good health and the time of excessive smartphone use, a Chinese study with a population in different age groups showed a relationship between problematic smartphone use with symptoms of depression and anxiety generated during the COVID-19 pandemic[12]. Such divergence can be explained by the absence of a specific instrument in the present study to assess mental health and symptoms related to mood and anxiety disorders, focusing only on a self-perception of health.

In view of the findings of the present study, the importance of effective health promotion strategies aimed at the adoption or maintenance of healthy behaviors related to the health of older people and the conscious use of the smartphone, through a support network involving the health system, family and public bodies. Also noteworthy is the importance of ergonomics regarding the use of technological devices, such as smartphones, tablets and computers, in addition to body awareness and the maintenance of good posture as preventive measures for musculoskeletal disorders.

Some limitations can be considered in the present study, in addition to those pertinent to the cross-sectional study and information bias. The absence of a specific instrument to assess general health may have interfered with the analysis of this variable. The smartphone usage time may have been underestimated or overestimated by the participants, due to the impossibility of using some kind of measurement through the online survey.

Another limitation was the sample profile due to the voluntary respondent bias, which encompasses the possibility that people more interested in the topic have participated. As a result, snowball sampling methods and social networks were used, seeking to minimize self-selection bias and homily. Still on the sample, the number of participants was linked to the sample calculation of the umbrella project and there was no adjustment for possible differences between age, sex and education. About 1.1% of those who accessed the link indicated that they would not participate, representing a low non-response rate. However, this value was imprecise due to the absence of a measurement strategy.

These limitations may make it difficult to generalize the results to other populations, however, it is believed that the findings of this study contribute to the discussion about smartphone use by older people during the pandemic.

CONCLUSION

A high percentage of the sample stated an increase in the time of smartphone use in the last three months, with an average of 4h12min per day being self-declared, higher than the international average in the year 2020. Regarding related health conditions, the younger seniors, non-practitioners of physical activity and with more time sitting, spent more time using the smartphone.

With regard to health conditions during the COVID-19 pandemic, a relevant portion of the older people participants had unhealthy behaviors, such as lack of physical activity, long sitting time and changes in sleep. In addition, a high percentage reported complaints of neck pain with the presence of functional disability in the cervical region.

Due to the results obtained, the importance of health promotion strategies aimed at healthy behaviors and conscious use of the smartphone by

older people is highlighted, involving the triad of care for older people. The importance of ergonomic guidelines regarding the use of technological devices, the adoption of correct posture and the performance of stretching/relaxation techniques as preventive measures for musculoskeletal disorders is also highlighted. Continuous assessment of the impact of these pandemic-fighting measures on health behaviors is necessary to support these health promotion strategies.

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Original Articles

1 of 13

Covid-19 infodemic on older people with access to digital media: factors associated with psychopathological alterations

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Abstract

Objective: to analyze the sociodemographic profile and COVID-19 infodemic's repercussions on psychopathological alterations in older people with access to digital media. *Method:* cross-sectional study by web-based survey in the population over 60 years old who use digital media. Descriptive analysis considered sociodemographic variables and other variables related to exposure to information about COVID-19; a set of signs and symptoms to psychopathological alterations due to this exposure were analyzed. Data analyzed by the Mann-Whitney, Kruskal-Wallis tests and Spearman's correlation coefficient. *Results:* a total of 470 older people were included in the survey, 61.3% aged 60 to 69 years, 67.2% female, 71.1% white race/color and 41.3% with higher education. 89.4% of respondents be exposed to news and information about COVID-19 on television, and 71.3% on social network. The most cited psychic symptoms were feeling worried (76.9%), fear of death of dear people (76.8%) and fear of getting sick (74%). Psychopathological alterations were observed in 3.8% of women and 5.9% of men. These sign and symptoms were associated with a lower level of education, a decrease in post-pandemic income and felt affected by the news about COVID-19 on social networks. *Conclusion:* COVID-19 infodemic is associated with psychopathological alterations in older people. Even with the increase in access to social networks, the main media used by older people is television. Strategies for digital inclusion and literacy should be developed, offering tools for older people to fight the COVID-19 infodemic.

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INTRODUCTION

The media, both traditional and digital, due to their ability to disperse, reach different audiences and allow citizens to receive and share information quickly, often without checking the veracity of the news[1]. The use of Information and Communication Technologies (ICTs) requires from the current generation of older people the need to acquire new skills without resorting to previous knowledge[2].

Internet use in Brazil, although increasing in all age groups, was faster in older ages. There was an increase in the percentage of people aged 60 or over who used the internet between 2018 (38.7%) and 2019 (45.0%), probably due to the evolution in the ease of use of this technology and its dissemination in the daily life of society since previous decades[3].

In 2020, the pandemic of the disease caused by the new coronavirus (SARS-CoV-2) imposed behavioral alterations in all societies. The greater vulnerability of older people and people with comorbidities to develop the most severe form of the disease and, therefore, to present higher mortality rates, together with the risk of spreading COVID-19 and the concern about the economic, social and health impacts, led to several countries to adopt containment measures, including social isolation[4,5]. In this context, ICTs have become important in communicating with the outside world[6]. A substantial increase in the search for information related to the illness or health services has been observed during the COVID-19 pandemic[7].

Digital media are capable of disseminating information with greater volume, speed and effectiveness than traditional media, either by integrating many users into a single shared network or by propagating information through a wide variety of content types, such as text, audio, image, video[8]. In this context, the infodemic phenomenon can be conceptualized as the excess of information, some accurate and others not, which makes it difficult to find reputable sources and reliable guidelines, generating opinions and social behaviors that can potentially be a risk to people's health[9].

The literature points out the importance of access to ICTs by older people[4], however, the impact of excess information on these subjects at this time of a pandemic should be analyzed, due to their greater vulnerability, whether to the disease and its repercussions[6], or to the low mastery of these technologies and ability to assess the quality of information[10].

Among the main repercussions of the infodemic on the mental health of the adult and older population, a scoping review identified that anxiety (69.7%), depression (51.5%), stress (36.4%) and fear (21.2%) were the most frequent infodemic-related signs and symptoms in 33 publications. It was found that the sources of information play a fundamental role in the development of these and other symptoms and that the increase in anxiety is one of the repercussions of the time of exposure to information conveyed by digital social networks[11]. The gaps pointed out by this review[11] and the lack of Brazilian studies on this topic encourage studies of this nature, aiming to increase the production of scientific evidence on the consequences of the infodemic associated with psychopathological alterations, especially in older people. The vulnerability due to the quantitative increase of information may be more evident in this population group, which does not always know or practice the recommendations of information checking amidst the profusion of wrong news, unrelated to the existing misinformation in cyberspace and potential disseminators of fake news[10].

Thus, one of the current concerns is to analyze the way in which older people consume the media and the repercussions of these in the course of aging itself[12]. In addition, knowing the profile of the older population regarding the use of the media and the association of this use with the needs, motivations, attitudes and interests in this period of life[12] is fundamental for decision-making and the development of public policies[13].

The aim of this study was to analyze the sociodemographic profile and repercussions of the COVID-19 infodemic on psychopathological alterations in older people with access to digital media.

METHODS

Cross-sectional study, carried out by web-based survey, conducted between the months of July 2020 and December 2020, with the population aged 60 years or older, residing in Juiz de Fora, in the interior of Minas Gerais, Brazil, who said they had access to social media and e-mail and/or telephone, and with the ability to answer the questionnaire using digital media or even the telephone. The phenomenon of population aging in this municipality can be observed with a 45% increase in the number of older people between 2000 and 2010, a percentage greater than that of Minas Gerais (42%) and Brazil (41%)[14]. According to estimates by the João Pinheiro Foundation for the Intermediate Geographical Region of Juiz de Fora, the relative share of the age group aged 65 and over in the total population is expected to rise from the 10% achieved in 2010 to 21% in 2040[15].

This is one of the studies of phase 1 of the mixed multicenter investigation, with a sequential transformative strategy, entitled "COVID-19 infodemic and its repercussions on the mental health of older people: a multicenter Brazil/Portugal/Chile/Mexico/Colombia/Peru study". It had a non-probabilistic sample calculated from the finite population over 60 years old residing in the city of Juiz de Fora, estimated for the year 2019, a prevalence of 50% of psychopathological alterations, with a 5% sampling error and a 95% confidence level.

Pilot interviews were carried out to adapt the questionnaire, minimizing potential sources of bias. The approach to the population was made by sending the link to access the electronic questionnaire by email or through social networks (Whatsapp, Facebook and Instagram), in addition to using telephone calls to invite them to receive the link or answer the questionnaire over the phone, if they said they used digital media. The virtual snowball strategy[16] was used requesting the sharing of the link to networks that contained contacts of older people. The web-based survey, made up of mandatory questions in order to follow up, was also sent to municipal scientific societies of geriatrics and gerontology, as well as to retirees' associations in the city of Juiz de Fora.

The criteria for inclusion in the study were 60 years of age or older and access to digital media; for exclusion, declaring not to have the ability to answer the questionnaire using digital media or even by phone. Only participants who accepted the digital Free and Informed Consent Form (ICF) were directed to the questionnaire.

Demographic and socioeconomic data were collected: sex (male, female and undeclared), age group (60-69 years, 70-79 years, 80 years or older), marital status (with a spouse, without a spouse), race/color (white, others), number of people living in the household (lives alone, with 1 to 2 people, with 3 or more people), condition of the residence (own, other type), region of residence (urban area, rural area), education (elementary, high school, higher education or more), use of health services (only SUS, private and private+SUS), number of income dependents (no dependents, 1 to 2, 3 or more), source of income (up to 1 source of income, more than 1 source of income), change in income with the COVID-19 pandemic (equal or higher income, lower income).

Other data collected refer to exposure to news and information about COVID-19: hours of exposure per day on social networks, television and radio, frequency in the last week (exposed, not exposed) in different media (social networks, TV, radio), equipment most used to access news and information (social networks, television, radio, newspapers or printed magazines), information from social networks, TV or radio has affected (analyzed dichotomized into yes and no and also categorized into not feeling affected, feeling affected physically, psychologically, physically and psychologically), fear responses, awareness, stress, security and/or anxiety that this information generated (some response, no response) when referring to the number of infected and dead by COVID-19, about fear related to the disease, photos, videos and fake news about COVID-19, broadcast on social networks, TV and radio, frequency of signs and symptoms observed when exposed to information about COVID-19, in the last 15 days, being evaluated by the summation of questionnaire points and dichotomized from positive screening for psychopathological alterations through exposure to information about COVID-19 (case and non-case).

This screening was carried out from a set of questions that make up a scale, still in the validation process, prepared by the research group[17] and developed with questions related to the frequency with which 34 signs and symptoms of psychopathological alterations manifested in the last 15 days, for the older person to have contact with information about COVID-19 (news on TV or on the internet, WhatsApp messages, Youtube videos, among others). A four-point Likert scale was used (0 – never, 1 – a few times, 2 – sometimes, and 3 – often), where higher scores indicate a greater burden of psychopathological alterations resulting from exposure to information about the pandemic. The total score ranges from zero to 102, computed by adding the score for each item. The instrument showed adequate internal consistency: Cronbach's alpha (α=0.964; 95%CI=0.962–0.966), Greatest Lower Bound (glb=0.981; 95%CI=0.981–0.983), mean inter-item correlation (r=0.441; 95%CI=0.427–0.456) and corrected item-total correlation (0.346≤0.798). Regarding validity evidence based on the internal structure, robust exploratory factor analysis attested that it is a one-dimensional measure. This measure could not yet be subjected to sensitivity and specificity analyses. However, according to Crawford and Garthwaite, percentile classifications express scores more relevantly than other metrics, allowing to describe how common or uncommon the measured constructs in the investigated sample are[18]. Based on this framework, the authors suggest that the 95 percentile of the gross total score be considered as a cut-off point for the suggestion of psychopathological alterations. Thus, in the first analyzes for validation, a difference was observed in the mean score between men (M=20.30; SD=19.94; 95%CI=19.03≥21.57) and women (M=26.54; SD=21.81; 95%CI=25.59≥27.49).

The collected data were submitted to exploratory analysis in order to obtain descriptive statistics of sociodemographic indicators and variables related to the infodemic. The Kolmogorov-Smirnov test indicated that the data distribution did not follow a normal pattern, so non-parametric tests such as Mann-Whitney or Kruskal-Wallis were used in the bivariate analysis, with a 95% confidence interval. To analyze the correlation between the signs and symptoms of psychopathological alterations and the amount of hours of exposure to the media (social networks, television and radio), Spearman's correlation coefficient was used. Variables that presented p≤0.10 were taken to the multiple linear regression by the backward method, while variables with p<0.05 were kept in the final model.

The present research complied with ethical criteria and was approved by the National Research Ethics Commission (CONEP) under protocol number 4.134.050.

RESULTS

A total of 517 questionnaires were received which, after excluding duplicates (19) and residents in a Long-Term Institution (28), resulted in a sample consisting of 470 respondents. This sample was mainly characterized by female respondents (67.2%), white race/color (71.1%), with a spouse (56.2%), in their own residence (81.5%), located in the urban area (97.0%) and living with 1 to 2 people (55.5%). Among the survey participants, 40.6% reported having a college degree or higher education and 41.3% said they used both paid and unpaid health services. As for income, they reported living with only one source of income (81.5%), having 1 to 2 dependents (57.2%) and not having their income changed due to the COVID-19 pandemic (78.3%). The mean age of the respondents was 68.82 years (sd±6.97) and most were aged between 60 and 69 years (61.3%).

With regard to daily exposure to news and information about COVID-19, it was found that, on average, the older people reported 3.72 hours (median=2.00; P25=1.00; P75=6.00) on television, 3.08 hours (median=1.00; P25=0.00; P75=4.00) through social networks (Whatsapp, Facebook, Youtube, Instagram and others) and less than 1 hour (median=0.00; P25=0.00; P75=2.00) by radio. They said they were exposed to news or information about COVID-19 during the last week, 89.4% on television, 71.3% on social networks and 42.8% on radio.

The items most cited as used to access news and information about COVID-19 were: television (82.55%), Whatsapp (44.04%), radio (32.76%), Facebook (31.70%), websites (31.70%), printed

newspapers or magazines (23.83%), Youtube (18.29%), Instagram (13.61%), Twitter (1.91%) and Telegram (1.91%).

Regarding the self-perceived impact of information about COVID-19, most of the older people answered that they did not feel affected by the information broadcast on social networks (58.2%) and on the radio (70%). However, for the media most used by the older people, television, 51.0% felt physically or psychologically affected by this information (Figure 1).

The analysis of the repercussions of news about COVID-19 regarding the number of infected, number of deaths, fear related to the disease, photos, videos and fake news, disseminated in different media (social networks, television and radio), generated in the older people surveyed awareness responses (33%), fear (24.6%), anxiety (16.5%), stress (14.4%) and security (2.1%). The most cited answer may indicate that the contact with the information provided did not affect the emotional condition, being a reason to become aware of the pandemic, its risks and forms of prevention.

When having contact with information about COVID-19 (news on TV or on the internet, Whatsapp messages, Youtube videos, among others) the older people reported responses such as concern (76.9%),

fear that loved ones would die (76.8%) and fear of getting sick (74.0%) (Table 1).

These signs and symptoms of psychopathological alterations had a mean score of 22.89, with a median of 17.00 (IQ=27.00). A significant difference (p>0.01) was found between women (median=20.00; P25=9.00; P75=37.00) and men (median=13.00; P25=5.00; P75= 24.00), being positive for 3.8% of women and 5.9% of men.

An association of these psychopathological alterations with demographic and socioeconomic variables and with those related to exposure to information about COVID-19 was also found (Table 2). The demographic and socioeconomic variables associated with the outcome were: female gender, elementary schooling level, residence in non-own property, use of private health services and the SUS, 1 to 2 dependent on their income, lower post-pandemic income. The associated variables referring to exposure to news and information about COVID-19 were: greater number of hours per day and greater frequency of exposure to news and information about COVID-19 broadcast on social networks and TV, feeling affected by this information via social networks, TV and radio and the responses generated in the older people when exposed to information about COVID-19 (number of infected, dead, fear related to the disease, photos, videos and fake news) in the researched media.
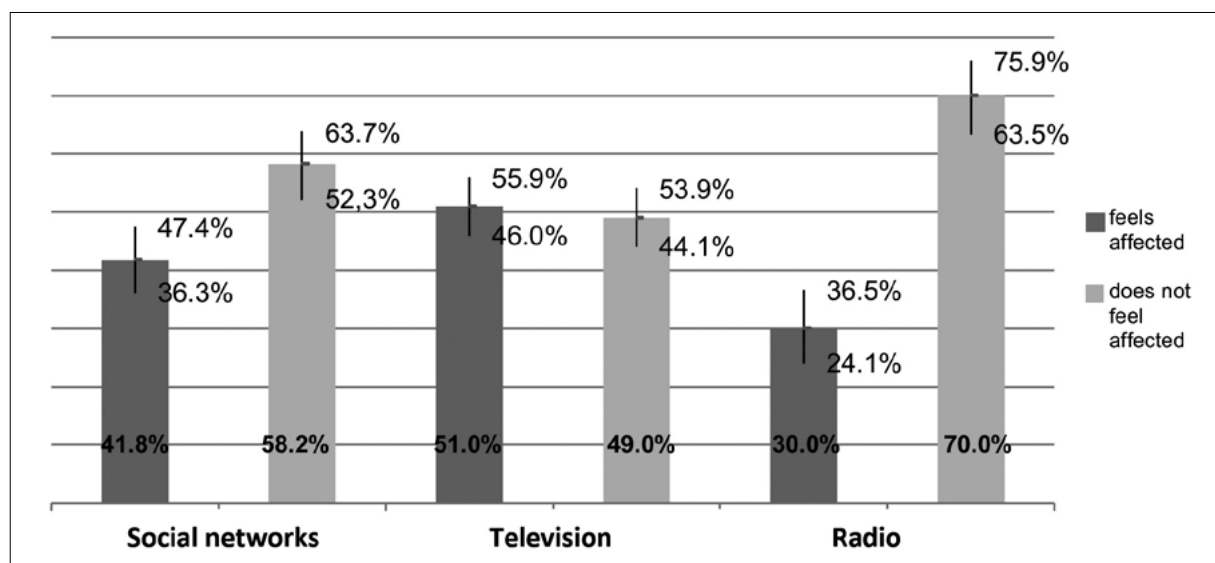
95% confidence interval.

Figure 1. Self-perceived impact of information about COVID-19 in the media (n=470). Juiz de Fora, Minas Gerais, Brazil, 2020.

Table 1. Signs and symptoms of psychopathological alterations due to exposure to information about COVID-19 in the last 15 days. Juiz de Fora, Minas Gerais, Brazil, 2020.

Symptoms	n (%)
Hopelessness or pessimism	283 (61.0)
Cold sweat or chills	82 (18.0)
Irritation	262 (56.6)
Unwillingness to do daily activities	190 (41.1)
Fear of getting sick	347 (74.0)
Nervousness	276 (59.7)
Panic	126 (27.3)
Higher consumption of alcohol or tobacco	83 (18.0)
Decreased desire for sex	121 (26.5)
Fear of dying	264 (56.7)
Digestive problems	117 (25.3)
Dry mouth	135 (29.0)
Lack of interest in everyday activities	189 (40.6)
Lack of energy	200 (43.2)
Chest tightness	127 (27.4)
Concern	360 (76.9)
Use of illegal substances	16 (3.5)
Willingness to die	47 (10.1)
Anxiety	289 (62.3)
Difficulty breathing	68 (14.7)
Sadness	305 (64.9)
Afraid but I don't know what	212 (45.7)
Dismay	237 (51.0)
Anger	186 (40.1)
Tremor	48 (10.4)
Headache	126 (27.3)
Muscle aches	159 (34.2)
Sleep issues	203 (43.8)
Nutritional problems	144 (30.9)
Palpitation	98 (21.1)
Tiredness	183 (39.5)
Fear that loved ones will die	360 (76.8)
Use of psychotropic drugs	124 (26.7)
Wants to be alone	150 (32.4)

Table 2. Factors associated with signs and symptoms of psychopathological alterations through exposure to information about COVID-19 (n=470). Juiz de Fora, Minas Gerais, Brazil, 2020.

	Median (IQ)	P-value
Demographic and socioeconomic variables		
Sex (n=470)		<0.01
Female	20.00 (28.00)	
Male	13.00 (21.00)	
Age group (years) (n=470)		0.14
60-69	17.00 (28.75)	
70-79	16.00 (22.5)	
≥80	17.00 (29.5)	
Marital status (n=470)		0.11
With spouse	16.00 (24.00)	
No spouse	19.50 (27.25)	
Race (n=470)		0.87
White	17.00 (25.00)	
Others	17.50 (27.75)	
Living status (n=470)		0.65
Alone	16.00 (32.00)	
With 1 to 2 people	17.00 (27.00)	
With 3 or more people	19.00 (24.00)	
Residence status (n=470)		0.01
Own residence	17.00 (24.00)	
Another type	28.00 (35.00)	
Region of residence (n=470)		0.12
Urban	17.00 (26.00)	
Rural	24.50 (43.75)	
Level of education (n=470)		0.04
Basic	17.00 (28.00)	
High school	15.00 (22.25)	
Higher or more	20.00 (26.00)	
Use of health services (n=470)		0.06
SUS only	15.00 (24.50)	
Private and Private+SUS	18.00 (25.50)	
Depends on the income of the older person (n=470)		0.03
No dependents	12.00 (21.00)	
1 to 2 dependents	17.00 (28.00)	
3 or more dependents	17.50 (26.75)	
Source of income (n=470)		0.49
Up to 1 source of income	17.00 (26.00)	
More than 1 source of income	16.00 (24.00)	
Post-pandemic income (n=470)		0.01
Equal or greater	16.00 (24.00)	
Smaller	25.00 (32.00)	

to be continued

Continuation of Table 2

	Median (IQ)	P-value
Variables regarding exposure to news and information about COVID-19		
Hours/day (n=470)		
Social networks	1.00 (4.00)	<0.01
Television	2.00 (5.00)	<0.01
Radio	0.00 (2.00)	0.57
Frequency in the last week (n=470)		
Social networks		<0.01
Exposed	20.00 (27.00)	
Not exposed	11.00 (22.00)	
Television		0.02
Exposed	18.00 (26.00)	
Not exposed	13.50 (17.50)	
Radio		0.69
Exposed	17.00 (23.50)	
Not exposed	17.00 (29.00)	
Affected -Social Networks (n=316)		<0.01
Yes	37.00 (33.25)	
No	13.00 (17.75)	
Affected – Television (n=416)		<0.01
Yes	30.00 (29.00)	
No	10.00 (16.00)	
Affected – Radio (n=223)		<0.01
Yes	34.00 (36.00)	
No	12.50 (20.00)	
GENERATED ANSWERS - SOCIAL NETWORKS		
Number of Infected (n=337)		<0.01
any answer	22.00 (27.00)	
No answer	10.50 (14.50)	
Number of Deaths (n=340)		<0.01
any answer	21.00 (25.00)	
No answer	6.00 (19.50)	
Fear related to COVID-19 (n=324)		<0.01
any answer	24.00 (26.00)	
No answer	13.00 (14.50)	
Photos related to the pandemic (n=321)		<0.01
any answer	13.00 (14.50)	
No answer	13.00 (20.50)	
Videos related to the pandemic (n=326)		<0.01
any answer	23.50 (25.50)	
No answer	13.00 (13.75)	
Fake news (n=318)		<0.01
any answer	24.00 (26.75)	
No answer	13.00 (16.00)	

to be continued

Continuation of Table 2

	Median (IQ)	P-value
GENERATED ANSWERS - TV		
Number of Infected (n=416)		<0.01
any answer	19.00 (26.25)	
No answer	3.00 (5.25)	
Number of Deaths (n=412)		<0.01
any answer	19.00 (27.00)	
No answer	4.00 (5.75)	
Fear related to COVID-19 (n=407)		<0.01
any answer	20.00 (27.00)	
No answer	5.00 (13.00)	
Photos related to the pandemic (n=404)		<0.01
any answer	20.00 (27.75)	
No answer	5.50 (13.50)	
Videos related to the pandemic (n=397)		<0.01
any answer	20.00 (27.00)	
No answer	5.00 (13.00)	
Fake news (n=390)		<0.01
any answer	21.00 (27.00)	
No answer	8.50 (14.25)	
GENERATED ANSWERS - RADIO		
Number of Infected (n=196)		<0.01
any answer	17.00 (23.50)	
No answer	7.00 (17.50)	
Number of Deaths (n=200)		<0.01
any answer	17.00 (25.75)	
No answer	7.00 (17.50)	
Fear related to COVID-19 (n=196)		0.01
any answer	17.00 (27.25)	
No answer	13.00 (18.25)	

The variables that remained significant in the final model (p<0.05) after adjustments were: education level (higher or more), post-pandemic income (lower) and feeling affected by news and information about COVID-19 broadcast on social networks (no) (Table 3).

Table 3. Multiple linear regression model predictors of psychopathological alterations upon exposure to information about COVID-19. Juiz de Fora, Minas Gerais, Brazil, 2020.

Adjusted r2	0,61			
Variables	B	95% CI	p	β
Education Level (Higher or more)	-7.52	-13.10 – -1.93	0.01	-0.24
Post-pandemic income (Lower)	9.50	0.74 – 18.26	0.03	0.17
Feels affected by news published on social networks (No)	-25.53	-47.27 – -3.79	0.02	-0.51

Durbin-Watson Test = 2.04, p>0.01, r²=0.71.

DISCUSSION

The findings of this study revealed an association between education level, post-pandemic income and the fact of feeling affected by news broadcast on social networks with signs and symptoms of psychopathological alterations due to exposure to information about COVID-19, indicating that a greater burden of these alterations was found in those older people with lower levels of education, decreased income in the post-pandemic period and who reported feeling affected by this information published on social networks.

A scoping review found an association between a higher level of education and the chance of developing anxiety and depression, explaining that the level of education could be related both to understanding the severity of the pandemic situation and to the search for information about COVID-19[11]. However, a study conducted in the older population of the Southeast region of Brazil pointed out that more educated older people had lower rates of depression and loneliness due to greater resilience and social support[19]. The present study corroborates this finding, since it found a greater burden of psychopathological alterations associated with older people with lower levels of education.

Another factor associated with psychopathological alterations found in this study was the decrease in income after the advent of the COVID-19 pandemic. The PNAD COVID-19 reveals that, among the population aged 60 and over, there was a loss of 22% of average earnings from work[20]. Although 73.6% of the older people are retired or pensioners[20], the reduction in income from work ends up impacting their families, since the income of the older person plays an important role in the household where they live and that financial insecurity affects mental health[21].

Also associated with problems related to mental health, social isolation contributed to greater exposure of people to information disseminated by digital social networks[11]. The fact of feeling affected by information about COVID-19 published on social networks was associated, in the present study, with signs and symptoms of psychopathological alterations.

From the exacerbated increase in information and misinformation and the mismatch of public authorities in statements about the pandemic, an environment of insecurity and fear was created for the population. During outbreaks, epidemics and pandemics, the communication process becomes even more important so that accurate information is transmitted and received in a way that does not generate doubt and confusion[22]. The infodemic has abruptly reached people who are unaware of or lack the ability to use and properly criticize information and its sources[23]. A greater number of older female respondents were found, aged between 60 and 69 years, with a spouse, higher education and living with other people, data also found in another web-based survey conducted during the pandemic in Brazil[19]. The sociodemographic profile of this sample may indicate a new pattern among older people who use digital media: well educated, with access and knowledge to use the internet[19]. Thus, the results can be generalized to older people users of social networks.

According to a North American study, limiting factors regarding the use of technology were less perceived by the older population with higher income and education. With increasing age among older people, limitations were perceived as more restrictive[24]. Digital media can minimize the effects of social isolation[25], which further impact families who are economically and socially vulnerable[26].

A higher frequency of television use was found to access news and information about COVID-19. A study among older Brazilians proved the supremacy of the use of this media over the others and addressed the concern about the impact of excessive exposure on the physical health, psychological condition and quality of life of these users[12].

It is noted that, although a greater number of older people use television to search for information, the variable that was associated with psychopathological alterations was that referring to news accessed through social networks. This finding may reflect the expansion of internet access and reveal the greater perception of the infodemic in digital media.

A Brazilian survey, also carried out with the virtual snowball strategy, conducted in 2018, with

384 older people, found that television was the main source of information among older people living in the Southeast and Midwest regions, and the internet among the residents of the North, Northeast and South. In addition, he mentioned that young older people (from 60 to 79 years old) used the internet daily and for more than 2 hours[27].

In 2019, among people aged 60 and over, 45.0% used the internet[28] and of these, 65% accessed it exclusively by cell phone[29]. However, a survey carried out in Brazil found that due to the COVID-19 pandemic, older people adopted social networks in their daily lives (91% with registration in one of them) and increased the length of stay in them (66% increased the frequency of use). The social networks most used by older people were Facebook, Whatsapp and Instagram[30], a result similar to that found in this research, with the most cited being Whatsapp, Facebook, Youtube and Instagram.

The psychic impact generated both by the greater vulnerability to the severity of COVID-19 and by the infodemic, can lead to a mental and emotional overload, leaving individuals anxious and depressed[31]. Regarding the responses generated in the older person due to information about COVID-19 published on social networks, television and radio, it was found that "fear", "anxiety" and "stress" were frequent, although the answer of "awareness" was the most cited, indicating the need for more specific studies on this aspect.

It is estimated that between one-third and one-half of the population exposed to an epidemic may suffer some psychopathological manifestation if no specific care intervention is made for the reactions and symptoms manifested. The most frequently observed reactions in this context are: fear of getting sick, fear of dying and fear of losing loved ones[32]. The findings of the present research corroborate the above, since among the signs and symptoms suggestive of psychopathological alterations, those most cited were "concern", "fear that loved ones die" and "fear of getting sick".

It is noteworthy that cross-sectional studies are limited to infer causality due to the absence of temporality between the occurrence of the events

of interest. One of the limitations of web-based surveys is the fact that they end up leaving out a significant portion of people without internet access or less predisposed to participate in online surveys[19]. Other limitations refer to the probabilities of sample selection and the non-response rate that cannot be estimated, in addition to the fact that the connections between the participants are not known, which prevents considering the dependence of observations in the estimation of variance. Among the advantages of a web-based survey, a method that has been widely used, are the lower cost, agility in data collection and the possibility of reaching people with a specific profile and in dispersed locations[33].

CONCLUSION

The infodemic can generate negative implications that compromise the health of the older population and their social relationships, with a greater impact on those with a lower level of education and income, that is, with a greater degree of vulnerability.

Older people therefore carry a triple burden of vulnerability (as they are subject to more severe forms of the disease itself, to infodemics and to psychopathological alterations). In view of this, it is essential that studies and actions, in the field of collective health, to face COVID-19, take into account the particularities of this population.

Strategies to boost access and digital literacy for the older population, enabling the development of search, selection, analysis and decision-making skills[11], as well as the creation of media programs aimed at this age group, combating the spread of misinformation and allow information checking in a simple and practical way, can minimize the health risks arising from the infodemic.

New studies should contemplate mechanisms that increase the resilience of this population and explore the best appropriation of older people to digital technologies and tools that allow the verification of information.

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Headache in Brazilian older people in the context of COVID-19 infodemic

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Abstract

Objective: Analyze the prevalence and factors associated with headache in Brazilian older people in the context of COVID-19 Infodemic. *Methods*: This is a cross-sectional study carried out with 3,307 elderly Brazilians using a virtual questionnaire, self-completed using a cell phone, tablet or computer with internet access. Data collection was developed between June 2020 and January 2021. The analysis model consisted of variables distributed into four blocks: exogenous variables, primary determinants, health behaviors and health conditions. Poisson regression with robust variance was used to estimate the associations. *Results:* The prevalence of headache was 31.7%. The outcome was associated with the use of psychotropic drugs, concern with information about covid-19, symptoms of depression and anxiety, and perception of stress. *Conclusion:* Anxiety, depression and stress are thought to be associated with headache in older adults who are exposed to excess information and fake news about covid-19.

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INTRODUCTION

Information about the coronavirus, in the current digital age, spreads rapidly through different types of media, including false theories, causing misinformation, panic and confusion, generating the phenomenon characterized as infodemic[1-3]. In this context, there is a great concern with the older population, since there are already more than 1 billion people aged 60 years or more in the world[4], and it is noteworthy that the presence of older people as Internet users has been growing[5]. The dissemination of fake news puts the health of older people at risk, causing emotional and mental overload, leading to symptoms such as anxiety and depression[5]. Anxiety and depression are psychological disorders that in older people can be accompanied by symptoms such as isolation and lack of social connections, feelings of sadness and hopelessness, irritation and apathy[6].

The World Health Organization (WHO) declared COVID-19 a pandemic on March 11, 2020[7]. Older people suffer much more from the adverse effects of the pandemic, ranging from more serious complications of the disease and higher mortality[8] to impacts on mental health, such as anxiety, loneliness and sadness. In addition to these aspects, older people suffer from the fear of illness and even the fear of death[9-12].

COVID-19 is associated with perceptions of older people with headaches about social isolation, negative emotions and feelings[13]. Thus, headache appears as an important outcome in studies on the mental health of older people in times of a pandemic. Cephalalgia, popularly known as headache, is the most common neurological symptom affecting 46% of the world population[14]. In Brazil, the average prevalence of headache in one year is 70.6%[15]. Although the prevalence decreases with age, headache is the 10th and 14th most common pain symptom reported

among older women and men, respectively[16]. In addition, investigating headache in a context of a COVID-19 pandemic, with high risk for the older population, social and economic restrictions, with exposure to infodemics, can contribute to the knowledge about this silent and often intense and persistent human suffering. Thus, the objective of the present study was to analyze the prevalence and factors associated with headache in Brazilian older people in the context of COVID-19 Infodemic.

METHODS

This is a cross-sectional study carried out with 3,307 Brazilian older people, between June and December 2020, using a virtual questionnaire, self-completed using a cell phone, tablet or computer with Internet access. This study presents the results from Brazil, from phase 1 of the investigation "COVID-19 infodemic and its repercussions on the mental health of older people: a Brazil/Portugal/Chile/Mexico/Colombia/Peru multicenter study". The sample size was estimated considering a 20% prevalence of depressive symptoms at the level of primary prevention in older people[17]. A 9% error was used and, therefore, a range of 0.33–0.51 was estimated. The sample was proportionally calculated in all eight surveyed host cities. In each municipality, 20% was added for eventual refusals and a 1.5 deff in order to protect precision, considering the structure of the sampling plan, totaling 2,976 respondents for the 8 municipalities. As it is a sampling by the virtual snowball method[18], there was an increase in the final sample in the study of 10.01% extrapolating the host cities (Figure 1). It is worth noting that these municipalities are the headquarters of the research collaborating centers where there were groups of older people accompanied by researchers and who started data collection.
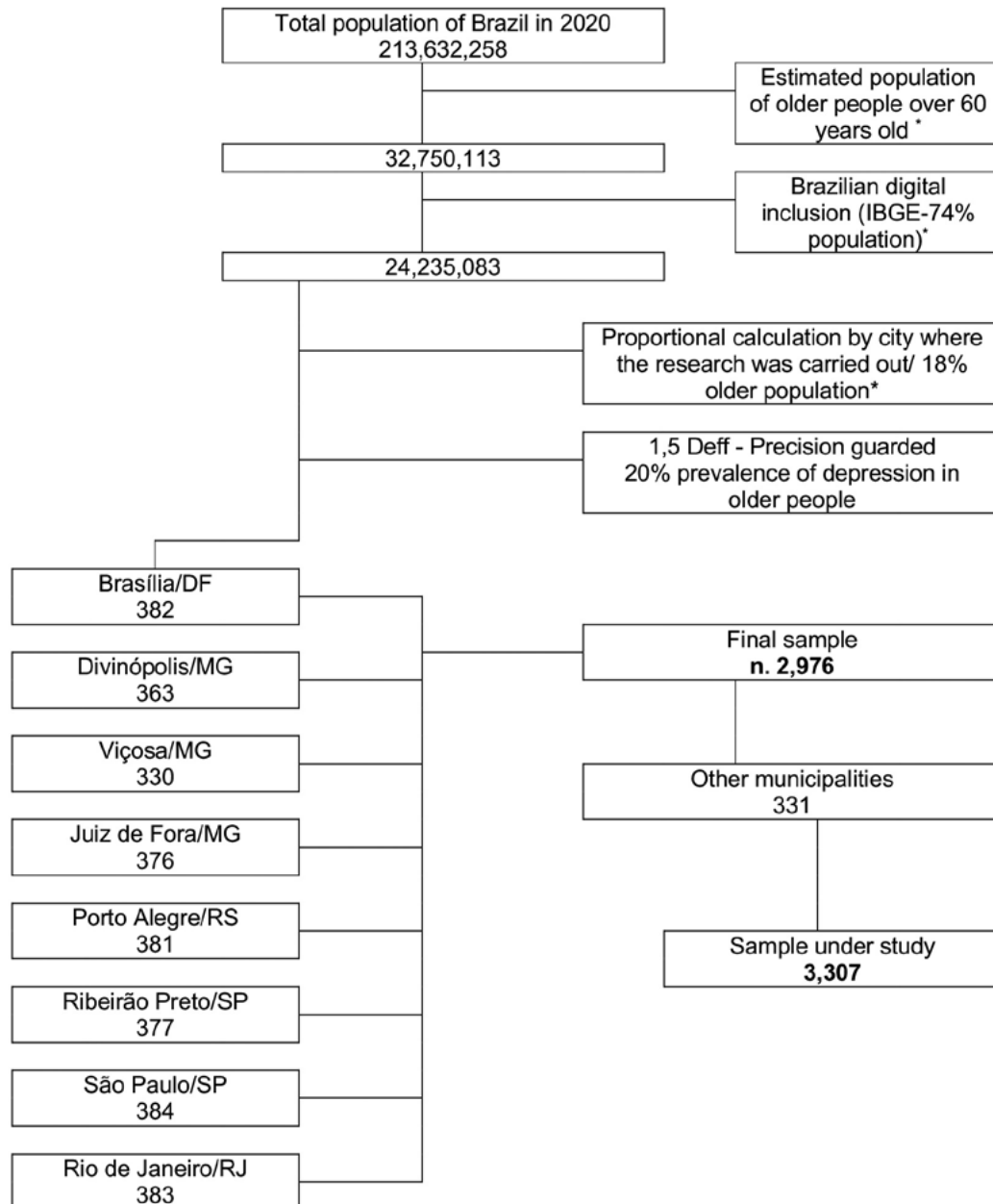
Figure 1. Sample flowchart for studying the mental health of older people exposed to information regarding the COVID-19 Infodemic. Brazil, 2020.

* Source: Preliminary estimates prepared by the Ministry of Health /SVS/DASNT/CGIAE, 2000 to 2019.

Data were collected through a web-based-survey. This survey was accessed through a link containing questions about: sociodemographic variables, exposure to news and information related to COVID-19, screening for depression, stress and anxiety. In this assumption, the headache was self-assessed through the question: "In the last 15 days, has information about COVID-19 and coronavirus caused me a headache?" (Yes or No).

The demographic and socioeconomic variables used were: age group (in years: 60 to 64, 65 to 69, 70 to 74, 75 to 79 or ≥80 years according to World Health Organization study protocols[10]), sex, race / self-reported skin color (white or non-white), marital status (married or not), education (incomplete elementary school, complete elementary school, complete high school, complete higher education, complete specialization or complete master's/

doctoral/postdoctoral studies), receives retirement/pension (yes or no) and income reduction due to the COVID-19 pandemic (yes or no).

Health behaviors included: increased alcohol/tobacco consumption during the COVID-19 pandemic, ("In the past 15 days has information about COVID-19 caused me to consume more alcohol/tobacco?" yes or no); use of psychotropic drugs (In the last 15 days, has information about COVID-19 caused me to use psychotropic drugs (eg, sleeping pills and/or anxiety)? yes or no); frequency of exposure to information or news was assessed on social media, television and radio ("How often have you been exposed in the last week to news or information about COVID-19"? (none, little/some or frequent).

Health conditions encompass the assessment of concern with information about COVID-19, depression, anxiety and stress. Concern about information about COVID-19 was assessed with the question "In the last 15 days has information about COVID-19 caused me concern?" (never, few times, sometimes or many times). The Geriatric Depression Scale (GDS-15), validated in Brazil, was used to detect the presence of depressive symptoms. Composed of 15 questions with binary answers (yes or no). The scores range from 0 to 5, classifying the older person as "without depressive symptoms", from 6 points "with depressive symptoms", with 5 being considered as a cutoff point[19]. The Geriatric Anxiety Inventory (GAI) was used to screen for anxiety symptoms with a cutoff point >8 and was dichotomized in the presence or absence of symptoms[20]. The instrument contains 20 questions with dichotomous responses with possible answers (0=agree; 1=disagree) with scores ranging from 0 to 20[20].

The Perceived Stress Scale-PSS, validated for Brazilian older people, evaluated the perception of stress. The PSS has 14 questions with response options ranging from zero to four (0=never; 1=almost never; 2=sometimes; 3=almost always 4=always). The scale total is the sum of the scores for these 14 questions and the scores can range from 0 to 56[21].

The hierarchical analysis used in this study was based on the theoretical model proposed by Andersen and Davidson (2007)[22]. The model was composed of variables distributed in four blocks: exogenous variables; primary determinants; health behaviors; and health conditions. The first block of the model was composed of exogenous and more distal variables: age, sex and self-reported color/race. In the second block, the primary health determinants, represented by marital status, education, receive retirement/pension and reduced income due to the pandemic. The third block of analysis was composed of health behaviors, represented by higher consumption of alcohol/tobacco, use of psychotropic drugs and frequency of exposure to news/information about COVID-19. In the proximal block, that is, in the fourth, the variables of health conditions were included, which include concern with information about COVID-19, suggestion of symptoms of depression, anxiety and perception of stress. And the assessed outcome was the presence or absence of self-reported headache in times of COVID-19 infodemic (Figure 2).

1st Block	2nd Block	3rd Block		4th Block
Age Sex Race/Color	Marital status Education Income Reduction of income	Higher Alcohol/Tobacco Consumption during the COVID-19 Pandemic Use of psychotropic drugs Concern about information about COVID-19 Exposure Social networks; TV; Radio	Depression Anxiety Stress	Headache
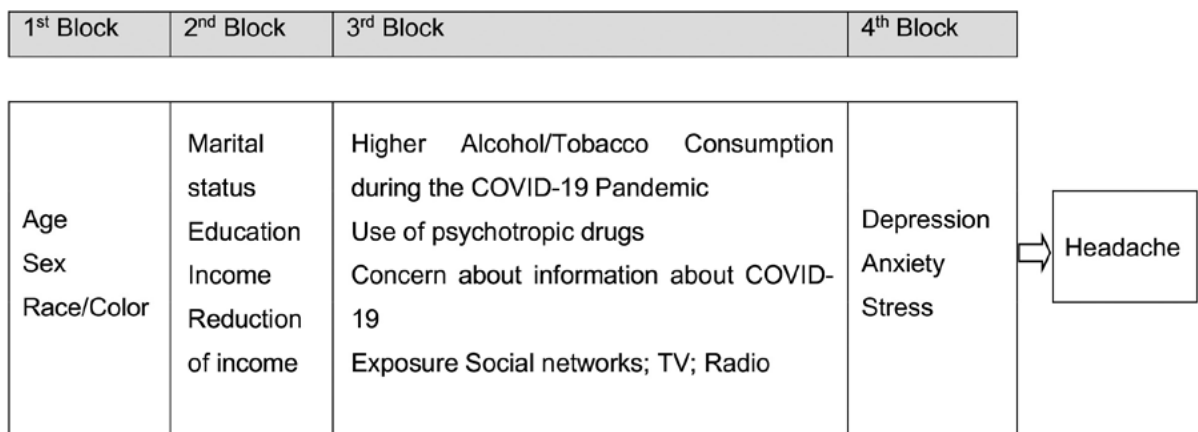
Figure 2. Theoretical model for headache analysis in older people in times of COVID-19 infodemic. Adapted from Andersen and Davidson (1997).

The chi-square test was performed to assess differences in the variables studied and when its assumptions were violated, Fisher's exact test was used, both with a 5% significance level. Poisson regression with robust variance was used to calculate crude and adjusted Prevalence Ratios (PR) and their respective 95% confidence intervals. The variables remained in the model when the p value of the Wald test was <0.10. A significance level of $p<0.05$ and a 95% confidence interval (CI) were considered, with calculation of adjusted prevalence ratios. To assess the quality of fit of the final model, the Goodness-of-fit test was used. In the analysis, the Omnibus test was also considered, which was useful to suggest whether the model fit or not. Thus, under the assumption of the non-collinearity model between the independent variables, the Omnibus test, when it presents significance, suggested that the model was adjusted to the data. The Goodness-of-fit test was used to analyze the residuals and the quality of fit of the final model. In the cases of Generalized Linear Models (GLM), some different types of residuals are defined capable of evaluating the fit of the model, the residual deviance. This was a measure capable of detecting atypical observations that influence the fit of the model. The reliability of the EDG-15, GAI and PSS instruments was evaluated using Cronbach's Alpha Coefficient, respectively, 0.72; 0.93 and 0.86.

The study was approved by the National Research Ethics Committee (CONEP) of the Ministry of Health. (CAAE 31932620.1.1001.5147).

RESULTS

In a descriptive panorama, the study highlights that the older people studied reflect the majority of women (68.40%), age group between 60-69 (66.70%), white (71.48%), basic, elementary school and/or high school (2.9%) with own income (77.56%). In the scenario of the COVID-19 pandemic, for the sample studied, income did not decrease (76.11%), there was no greater consumption of alcohol/tobacco (80.91%) and there was no use of psychotropic drugs (72.30%) and there was sometimes concern about information about the pandemic (28.69%). Still within this scenario, it was observed that most people do not show signs and symptoms of depression (60.20%), anxiety (70.09%), as well as perceived stress (50.65%) (Table 1).

This study analyzed the association between headache and health behaviors and conditions of 3307 older people in Brazil. Headache prevalence was 31.7% (95% CI: 30–33) (n=1047) in the context of the COVID-19 infodemic. In the bivariate analysis, the factors that were associated with the outcome were the use of psychotropic drugs, concern about information about COVID-19, depression, anxiety, and stress (Table 1).

In the multivariate analysis, no positive and statistically significant association was found in all blocks, all the results are described in Table 2. The variables that showed a statistically significant positive association, in the crude analysis and in the adjusted analysis, belonged to blocks 3 (health behaviours) and 4 (health conditions). The highest headache prevalence ratio was among older people who used psychotropic drugs (PR=1.64; 95%CI:1.48-1.82), concerned about information about COVID-19 (PR=2.67; 95%CI : 2.06-3.53), with symptoms of depression (PR=1.24; 95%CI: 1.09-1.41) and anxiety (PR=1.43; 95%CI: 1.27-1.61) and who perceived stress (PR=1.68; 95%CI: 1.43-1.97) (Table 2).

Table 1. Frequency distribution and association between exogenous variables, primary determinants, health behaviors, health conditions and headache reporting in the context of a COVID-19 infodemic. Brazil, 2020.

Variables	Headache report		Total	*p-value*
	Yes n(%)	No n(%)		
Age group (in years)				
60-64	385(30.0)	900(70.0)	1285	0.213
65-69	302(32.8)	619(67.2)	921	
70-74	166(33.0)	337(67.0)	503	
75-79	100(29.9)	234(70.1)	334	
> 80	96(36.4)	168(63.6)	264	
Sex				
Female	701(31.2)	1549(68.8)	2250	0.153
Male	343(33.0)	696(67.0)	1039	
Race/Color				
White	738(31.2)	1626(68.8)	2364	0.173
Not White	311(33.0)	632(67.0)	943	
Marital status				
Married	580(31.6)	1255(68.4)	1835	0.453
Not married	469(31.9)	1003(68.1)	1472	
Education				
Basic not completed	99(33.6)	196(66.4)	295	0.464
Basic/Fundamental	240 (33.7)	473 (66.3)	713	
High school	209 (29.1)	509 (70.9)	718	
Higher	202 (31.3)	443(68.7)	645	
Specialization	169(33.0)	343(67.0)	512	
Master's / Doctorate	130(30.7)	294(69.3)	424	
Income				
Yes	818(31.9)	1747(68.1)	2565	0.382
No	231(31.2)	509(86.8)	740	
Reduction of income				
Yes	238(30.2)	549(69.8)	787	0.164
No	810(32.2)	1707(67.8)	2517	
Higher consumption of Alcohol/Tobacco				
Yes	312(50.0)	312(50.0)	624	<0.001
No	713(27.0)	1932(73.0)	2645	
Use of psychotropic drugs				
Yes	543(60.8)	350(39.2%)	893	<0.001
No	488(20.4)	1903(79.6%)	2391	
Social networks exposure				
None	280(34.1)	542(65.9)	822	0.082
Little	436(29.8)	1028(70.2)	1464	
Frequent	333(32.6)	688(67.4)	1021	

to be continued

Continuation of Table 1

Variables	Headache report		Total	p-value
	Yes n(%)	No n(%)		
TV exposure				
None	121(30.7)	273(69.3)	394	0.151
Little	435(30.2)	1005(69.8)	1440	
Frequent	493(33.5)	980(66.5)	1473	
Radio exposure				
None	638(32.6)	1318(67.4)	1473	0.409
Little	290(30.3)	666(69.7)	956	
Frequent	121(30.6)	274(69.4)	395	
Concern information about COVID-19				
Never	58(8.7)	611(91.3)	669	<0.001
Few times	207(23.0)	693(77.0)	900	
Sometimes	356(37.5)	593(62.5)	949	
Often	419(54.0)	357(46.0)	776	
Depression				
Yes	680(51.7)	636(48.3)	1316	<0.001
No	369(18.5)	1622(81.5)	1991	
Anxiety				
Yes	591(59.8)	398(40.2)	989	<0.001
No	458(19.8)	1860(80.2)	2318	
Stress				
Yes	802(49.1)	830(50.9)	1632	<0.001
No	247(14.7)	1428(85.3)	1675	

Table 2. Crude and adjusted prevalence ratio of variables associated with headache outcome in older people in the context of the COVID-19 Infodemic. Brazil, 2020.

	Variables	Crude PR (95% CI)	p-value	Adjusted PR (95%CI)*	p-value
Block 1	Age group (in years)				
	60-64	1.00			
	65-69	1.01 (0.90-1.13)	0.906		
	70-74	1.04 (0.90- 1.13)	0.587		
	75-79	0.91 (0.76-1.08)	0.283		
	≥80	1.06 (0.89-1.26)	0.534		
	Sex				
	Female	1.00		1.00	
	Male	1.09 (0.99-1.20)	0.084	1.10 (1.00-1.21)	0.053
	Race/SkinColor				
	White	1.00			
	Not white	1.01 (0.91-1.16)	0.895		

to be continued

Continuation of Table 2

	Variables	Crude PR (95% CI)	*p*-value	Adjusted PR (95%CI)*	*p*-value
Block 2	Marital status				
	Not Married	1.00			
	Married	1.02 (0.93-1.12)	0.746		
	Education				
	Basic not completed	1.00			
	Basic/Fundamental	1.05 (0.88-1.25)	0.592		
	High school	0.98 (0.81-1.18)	0.825		
	Higher	1.04(0.86-1.26)	0.690		
	Specialization	1.07 (0.87-1.32)	0.524		
	Master's / Doctorate	0.98 (0.79-1.21)	0.842		
	Income				
	No	1.00			
	Yes	0.99 (0.88-1.12)	0.903		
	Income reduction				
	No	1.00		1.00	
	Yes	0.91 (0.81-1.01)	0.071	0.91 (0.82-1.01)	0.073
Block 3	Higher consumption of alcohol/tobacco				
	No	1.00		1.00	
	Yes	1.10 (1.00-1.20)	0.050	1.10 (1.00-1.20)	0.050
	Use of psychotropic drugs				
	No	1.00		1.00	
	Yes	1.63 (1.47-1.81)	0.001	1.64 (1.48-1.82)	<0.001
	Social media exposure				
	None	1.00			
	Little/Some	0.93 (0.82-1.10)	0.259		
	Frequent	0.96 (0.83-1.10)	0.520		
	TV exposure				
	None	1.00			
	Little/Some	1.10(0.95-1.28)	0.194		
	Frequent	1.11 (0.96-1.29)	0.157		
	Radio exposure				
	None	1.00			
	Little/Some	0.96 (0.87-1.07)	0.491		
	Frequent	0.90 (0.77-1.05)	0.163		
	Concern about information about COVID-19				
	Never	1.00		1.00	
	Few times	2.04 (1.55-2.67)	<0.001	2.05 (1.56-2.68)	<0.001
	Sometimes	2.54 (1.95-3.31)	<0.001	2.53 (1.94-3.31)	<0.001
	Often	2.69 (2.06-3.51)	<0.001	2.67 (2.06-3.53)	<0.001

to be continued

Continuation of Table 2

	Variables	Crude PR (95% CI)	p-value	Adjusted PR (95%CI)*	p-value
Block 4	Symptoms of depression				
	Absence	1.00		1.00	
	Presence	1.24 (1.09-1.41)	<0.001	1.24 (1.09-1.41)	<0.001
	Symptoms of anxiety				
	Absence	1.00		1.00	
	Presence	1.43 (1.27-1.62)	<0.001	1.43 (1.27-1.61)	<0.001
	Perception of stress				
	Absence	1.00		1.00	
	Presence	1.68 (1.43-1.97)	<0.001	1.68 (1.43-1.97)	<0.001

* Adjusted for the same level block and the top level. Model adjustment parameters using the Akaike Information Criteria (AIC) and the Bayesian Information Criteria of Schwarz (BIC): initial model (AIC = 3.860; BIC =4.036) and final model (AIC = 3.830; BIC = 3.897).

DISCUSSION

Related to the infodemic, the prevalence of headache found in this study is expressive and needs to be considered in any of the age groups in older people. The prevalence found was lower than that reported in two studies on the association between headache in older people[23,24]. Regarding the gender variable, no differences were found as reported in the aforementioned studies. According to the proposed analysis model, it was possible to identify that the use of psychotropic drugs, concern about information about the pandemic, depressive and anxiety symptoms and the perception of stress in older people in a COVID-19 infodemic scenario generate headaches. In the block that represents health behaviors, the increase in alcohol/tobacco consumption had no expressive prevalence and there was no association with headache in the proposed analysis model. No evidence was found in the known literature showing a relationship between higher alcohol/tobacco consumption and headache in older people.

Before the COVID-19 pandemic, anxiety and depression, within the spectrum of cognitive function in older people, were already associated with headache[25]. It is noteworthy that headache in older people is positively associated with indicators of stress, anxiety and depression[12,26], which is in line with the results of this study. Furthermore, the COVID-19 infodemic can lead people to become anxious and depressed[27] and the pandemic leads older people to develop feelings of loneliness and anxiety[28]. The mental health of older people and the association with headache and other variables is shown to be relevant in times of the COVID-19 pandemic[12,29-32]. However, no studies were found in the literature on the prevalence of self-reported headache in older people associated with the variables analyzed in the present study.

The use of psychotropic drugs by older people, associated with headache in times of COVID-19 infodemic, is something new in the literature. In addition, information related to drug therapy interventions deserve special attention from health authorities for the correct guidance on drug use during the pandemic[33]. In this sense, the association found between headache and use of psychotropic drugs highlights the association with mental health, and it is necessary to investigate drug therapeutic interventions in the context of the COVID-19 pandemic, as well as self-medication.

In times of COVID-19, a study on parafunctional habits, which can lead to facial and headaches, points out that the report of anxiety was not significantly associated with headaches in older people, being more prevalent in younger people[30]. These data are different from the findings of the present study, as there was a positive association between anxiety and headache in older people. It is believed that older people in stressful moments that generate anxiety such as the fact of living in a COVID-19

infodemic context can acquire parafunctional habits such as unilateral chewing, teeth clenching (type of bruxism) among others, which can lead to joint, facial and headache pain. Regarding the fact of being concerned with information about COVID-19, no study aimed at the older population was found in the main databases, but one study showed that 52.15% of respondents with an average age of 37 years old feel horrified and concerned about the pandemic[31]. It should be noted that false information about COVID-19 can cause psychological disorders, stress and depression regardless of age[5,34].

This work has some limitations. The first consists of the exclusive use of the virtual questionnaire to carry out data collection, as the older people who did not have access to the internet were excluded. Additionally, the researchers were unable to help the participant when he/she did not understand a research item. It is believed that those older people with some limitation of activities of daily living had support from other people to answer the questionnaires. However, as shown in other studies with collections over the Internet, there is a need to confirm whether the group of subjects in the network sample represents the general population[35]. However, as older people are considered a risk group, the use of the virtual collection resource was an important alternative source to assess older people in the context of the COVID-19 pandemic. It should be noted that to overcome these limitations, the authors relied on the fact that the use of collection through virtual snowballs is feasible for non-probabilistic sampling[35]. In this process, in an attempt to ensure that the

questionnaires were answered directly by older people, the links were initially triggered by social networks of partner institutions in the research, such as: Open Universities for older people; Non-governmental organizations for the conviviality of older people; and Associations of retired civil servants of the host municipalities, among others. In this way, the researchers were able to access a large number of active older people with access to social networks to answer the questionnaires. New studies should expand this search for other profiles of older people, for example, institutionalized older people, making the results more robust. It is important to consider the limitations between the comparison of these results due to contextual differences and in the way of measurement.

CONCLUSIONS

It is concluded that anxiety, depression and stress, in the analysis model proposed by the study, are associated with headache in older people who are exposed to excess information and false information about COVID-19. Thus, it is considered that in the scenario of the COVID-19 Infodemic, headache in older people who have access to information is shown to be an important marker of mental health associated with suggestions of depression, anxiety and stress. The results show the importance of planning coping strategies and organizing the health care model, as the psychological implications of the pandemic on the mental health of older people are not yet known.

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Original Articles

1 of 10

Depressive symptoms and associated factors in older people during the COVID-19 pandemic in the city of São Paulo-SP

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Abstract

Objective: To determine the presence of depressive symptoms and their associated factors in the elderly living in the city of São Paulo during the isolation of the covid-19 pandemic. *Method:* This is a quantitative, descriptive and cross-sectional study carried out with 411 elderly people living in the city of São Paulo. Demographic profile instruments, the Geriatric Depression Scale and a list of physical and psychological symptoms and substance use were used. *Results:* There was a predominance of females, between 60 and 69 years old, with a partner, higher education, and with no change in income. In addition, not having a partner ($p=0,02$), psychological symptoms such as lack of hope ($p=0,001$), fear ($p=0,008$) and desire to die ($p=0,003$), and physical symptoms such as tremor ($p=0,03$) and tiredness ($p<0,0001$) were associated with depressive symptoms. On the other hand, not using illegal substances ($p=0,03$) was considered a protective factor against the presence of these symptoms. *Conclusion:* It is necessary to be alert to any signs or symptoms that may indicate some mental suffering, suggesting the adoption of socialization measures.

Keywords: Depression. Elderly. Pandemics. Covid-19. Geriatric Nursing.

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INTRODUCTION

The World Health Organization, on March 11, 2020, characterized the epidemiological situation of COVID-19 as a pandemic[1], which brought with it a new scenario, where society began to perceive more intensely the lack of security regarding political decisions, especially, regarding the effective control of the disease in the world and in Brazil[2].

Under this lens, on the national scene, several measures were adopted, such as the Government of São Paulo, which decreed quarantine throughout the state, in order to restrict activities and limit social contact in order to prevent the spread of the virus[3]. In this context, total or intense social distancing was more pronounced in the older population, being more evident in females and retirees[4].

The mental health of the general population, especially in older people, has caused concerns, since they are more vulnerable to mental illness. This vulnerability comes not only because of the repercussions resulting from the physiological conditions inherent to the aging process[5], but also due to issues surrounding socialization, which has become notably compromised due to physical distancing adopted as the main security measure to prevent the transmission of COVID-19[6].

In addition, the mental health of the older population within the pandemic context has been the focus of studies. This scenario can be observed in studies carried out with older people living in the community, which showed that the prevalence of depressive symptoms (25%[7] - 39%[8]) and anxiety increased significantly during the pandemic[7,8] due to the risk of transmission of the virus to themselves and their family members and the lack of a treatment for the virus[9].

During the COVID-19 pandemic, emotions such as fear and anger increased the rate of manifestation of depressive symptoms and high levels of anxiety and stress in older people[10]. Furthermore, previous epidemics have shown that such conditions require more attention because they can cause depression, anxiety, mental illness and can lead to suicide in severe cases[8].

Therefore, the role of health professionals, especially nurses, in the prevention, identification, treatment and recovery of the older person who has depressive symptoms, especially after isolation and loss of family and friends due to COVID-19, becomes essential. In addition, the implementation of actions to prevent depressive symptoms and promote mental health are of great value to prevent the older population from having such symptoms, as well as providing an improvement in their quality of life.

Therefore, the objective of the study was to determine the presence of depressive symptoms and their associated factors in older people living in the city of São Paulo during the isolation of the COVID-19 pandemic.

METHOD

Quantitative, descriptive and cross-sectional study that is part of a larger study entitled "COVID-19 infodemic and its repercussions on the mental health of older people: a Brazil/Portugal/Spain/Italy/Chile/Peru multicenter study" carried out with older people who live in the city of São Paulo, between the months of July 2020 and January 2021.

The sample size was estimated considering the older population in the city of São Paulo, using the formula: $n = N.Z^2.p.(1-p)/Z^2.p.(1-p). + e^2.(N-1)$, where "n" is the calculated sample, "N" is the population, "Z" the standardized normal variable associated with the confidence level, "p" the true probability of the event ($P=(1-P)=0.5$, assumption of maximum variation), and "e" the sampling error. A sampling error of 5% and a confidence level of 95% were also used, based on IBGE projections for the older population in the city of São Paulo, thus estimating the number of 411 older people.

To participate in the study, participants had to meet the following inclusion criteria: age 60 years or older, internet accessibility, use of mobile devices or computers, and having answered all questions on the instrument. The exclusion criterion was living in a Long-Term Institution for Older People.

Data collection took place through a web-based survey, which was sent to participants through different means, such as Facebook, WhatsApp, among other social networks. In addition, the Dean of Culture and Extension at USP was asked to publicize the study through the USP 60+ Program.

To reach the sample, the virtual snowball technique was used, in which the researcher asks participants to refer to new informants with similar characteristics[12] (Flick, 2009). It is noteworthy that in the context of the pandemic, the older people were in isolation and, therefore, difficult to access in person. Thus, the older people identified by the researchers were asked to indicate other older people or to forward the invitation to their respective contacts.

For the collection of information, the following instruments were used:

- Demographic profile: in order to identify data, such as gender (male and female), age (in years), marital status (with and without a partner), education (without studies, elementary, high school and higher education), people who live with the older person (in number) and income modification during the pandemic (no, decreased and increased).

- Geriatric Depression Scale (GDS): instrument for tracking depressive symptoms in older people[13], validated for Portuguese[14], consisting of 15 items. It is an instrument that aims to assess the presence of depressive symptoms in the older population. The scale used presents dichotomous answers (yes and no), in which "yes" and "no" range from 0 to 1 point, depending on the question. The scale has a cutoff point of 5/6 points to categorize the older person with and without the presence of depressive symptoms.

- Self-reported symptoms: list of symptoms related to the psychological and physical changes that older people experienced during the COVID-19 pandemic. Thus, each symptom had a Likert-type response (no, few times, sometimes and many times). The symptoms were based on the impact that the person can suffer from fear according to the literature[15]. In addition, the consumption of illegal substances, alcohol and psychotropic drugs during the pandemic was questioned.

A descriptive analysis was performed, presented through absolute and relative frequencies for the categorical variables, and measures of central tendency (mean and standard deviation) for the continuous ones.

To analyze the depressive symptoms outcome variable (yes and no), multiple logistic regression was used, with the demographic variables (sex, age, marital status, education, people living with the older person and change in salary) as independent variables. On the other hand, the psychological, physical and substance use symptoms self-reported by the older person, which had four levels of response, were grouped as follows: yes (few, sometimes and many times) and no (never). All statistical analyzes have a $p<0.05$ significance.

The study was approved by the Ethics Committee of the School of Nursing at the University of São Paulo, with opinion Nº. 4,134,050. Upon accessing the link, participants were first directed to the digital Free and Informed Consent Form, where they could read and accept or not participate in the study. The acceptance or not to participate in the study was automatically registered in the database generated by the *web-based survey*.

RESULTS

It was identified that the prevalence of depressive symptoms in the older population was 39.7%. There was a predominance of females, those aged between 60 and 69 with a mean of 67.38 (SD ±6.8) years, with a partner, higher education and no change in income. In relation to the number of people who live with the older person, the average was 1.58 (SD = 1.37) people (Table 1).

Table 1. Sociodemographic characteristics of older people living in São Paulo (N=411). São Paulo, SP, 2021.

Variable	Category	Total n (%)	No symptoms n (%)	With symptoms n (%)
Sex	Female	314 (76.4)	190 (60.5)	124 (39.5)
	Male	97 (23.6)	58 (59.8)	39 (40.2)
Age	60 – 69	287 (69.8)	177 (61.7)	110 (38.3)
	70 – 79	97 (23.6)	57 (58.8)	40 (41.2)
	80+	27 (6.6)	14 (51.9)	13 (48.1)
Marital Status	With partner	232 (56.4)	146 (62.9)	86 (37.1)
	Without partner	179 (43.6)	102 (57.0)	77 (43.0)
Education	No education	12 (2.9)	7 (58.3)	5 (41.7)
	Elementary School	91 (22.1)	48 (52.7)	43 (47.3)
	High school	70 (17.0)	44 (62.9)	26 (37.1)
	Higher	238 (57.9)	149 (62.6)	89 (37.4)
People who live with the older person (Average; SD)		1.58 (1.37)	1.52 (1.39)	1.67 (1.34)
Income Change	No	292 (71.0)	183 (62.7)	109 (37.3)
	Decreased	109 (26.5)	59 (54.1)	50 (45.9
	Increased	10 (2.4)	6 (60.0)	4 (40.0)

The psychological symptoms that the older people showed most during the pandemic identified in the category were often: fear of family members dying (27%), worry (25.9%), fear of getting sick (18.1%) and anxiety (17.4%). (Table 2).

As for the physical symptoms that the older people presented during the pandemic more frequently according to the category, they were often: sleep problems (13.2%), decreased libido (11.9%), tiredness and lack of energy (10.1% each) and muscle pain (9.9%) (Table 3).

As for the use of substances self-reported with the category many times, the use of psychotropic drugs (7.7%) and illegal substances and tobacco (4.9% respectively) were identified (Table 4).

In the regression analysis, it was identified that risk factors such as not having a partner (p=0.02), presenting psychological symptoms such as hopelessness (p=0.001), fear (p=0.008) and the desire to die (p=0.003) were associated with the presence of depressive symptoms. Furthermore, physical symptoms such as tremor (p=0.003) and tiredness (p<0.001) were also associated with depressive symptoms. On the other hand, not using illegal substances (p=0.03) was considered a protective factor against the presence of these symptoms in older people during the pandemic (Table 5).

Table 2. Psychological symptoms self-reported during the pandemic by older people living in São Paulo (N=411). São Paulo, SP, 2021.

Psychological symptoms	Never n (%)	Few times n (%)	Some times n (%)	Many times n (%)
Will to die	346 (85.0)	19 (4.7)	18 (4.4)	24 (5.9)
Panic	285 (70.9)	49 (12.2)	37 (9.2)	31 (7.7)
Want to be alone	253 (62.2)	67 (16.5)	59 (14.5)	28 (6.9)
Lack of will	227 (55.8)	80 (19.7)	65 (16.0)	35 (8.6)
Lack of interest	225 (55.3)	98 (24.1)	49 (12.0)	35 (8.6)
Fear	201 (49.6)	91 (22.5)	72 (17.9)	41 (10.1)
Rage	196 (48.2)	78 (19.2)	69 (17.0)	64 (15.7)
Fear to die	179 (44.1)	90 (22.2)	80 (19.7)	57 (14.0)
Nervousness	176 (43.7)	101 (25.1)	71 (17.6)	55 (13.6)
Irritation	161 (39.8)	90 (22.2)	96 (23.7)	58 (14.3)
Discouragement	158 (38.8)	137 (33.7)	61 (15.0)	51 (12.5)
Hopelessness	158 (38.8)	86 (21.1)	117 (28.7)	47 (11.5)
Anxiety	145 (35.6)	111 (27.3)	80 (19.7)	71 (17.4)
Sadness	115 (28.2)	123 (30.1)	103 (25.2)	67 (16.4)
Fear family members die	85 (20.9)	84 (20.6)	128 (31.4)	110 (27.0)
Fear of getting sick	76 (18.6)	134 (32.8)	125 (30.6)	74 (18.1)
Worry	56 (13.9)	124 (30.8)	118 (29.4)	104 (25.9)

Table 3. Physical symptoms self-reported during the pandemic by older people living in São Paulo (N=411). São Paulo, SP, 2021.

Physical symptoms	Never n (%)	Few times n (%)	Some times n (%)	Many times n (%)
Tremor	338 (83.5)	18 (4.4)	24 (5.9)	25 (6.2)
Cold sweat or chills	326 (80.9)	31 (7.7)	28 (6.8)	18 (4.5)
Palpitations	312 (77.0)	39 (9.6)	24 (5.9)	30 (7.4)
Difficulty breathing	306 (75.4)	53 (13.1)	23 (5.7)	24 (5.9)
Dry mouth	295 (72.7)	41 (10.1)	39 (9.6)	31 (7.6)
Chest tightness	289 (71.2)	43 (10.6)	42 (10.3)	32 (7.9)
Digestive problems	275 (67.7)	60 (14.8)	48 (11.8)	23 (5.7)
Headache	274 (67.5)	63 (15.5)	37 (9.1)	32 (7.9)
Nutritional problems	249 (61.3)	65 (16.0)	56 (13.8)	36 (8.9)
Decreased libido	249 (60.3)	49 (11.9)	52 (12.7)	49 (11.9)
Muscle pain	233 (57.4)	68 (16.7)	65 (16 .0)	40 (9.9)
Tiredness	216 (53.1)	84 (20.6)	66 (16.2)	41 (10.1)
Lack of energy	207 (51.0)	105 (25.9)	53 (13.1)	41 (10.1)
Sleep problems	196 (48.0)	85 (20.8)	73 (17.9)	54 (13.2)

Table 4. Self-reported substance use during the pandemic by older people living in São Paulo (N=411). São Paulo, SP, 2021.

Substance use	Never n (%)	Few times n (%)	Some times n (%)	Many times n (%)
Illegal substances	367 (90.4)	6 (1.5)	13 (3.2)	20 (4.9)
Alcohol and tobacco	326 (80.3)	32 (7.9)	28 (6.9)	20 (4.9)
Psychopharmaceuticals	301 (74.3)	36 (8.9)	37 (9.1)	31 (7.7)

Table 5. Association between depressive symptoms and demographic factors, physical and psychological symptoms and substance use in older people living in São Paulo during the pandemic (N=411). São Paulo, SP, 2021.

Variable	Beta	p-value	95%CI
Marital status (with partner)	0.58	0.02	1.06 – 3.10
Hopelessness (no)	1.049	0.001	1.55 – 5.24
Fear of dying (no)	0.76	0.008	1.22 – 3.92
Will to die (no)	2.34	0.003	2.18 – 50.23
Tremor (no)	1.57	0.003	1.74 – 13.45
Tiredness (no)	1.19	<0.001	1.92 – 5.69
Use of illegal substances (no)	-1.99	0.03	0.02 – 0.82

DISCUSSION

In the study, it was identified that the presence of depressive symptoms in older people during the pandemic may be associated with demographic factors such as marital status, presence of psychological and physical symptoms and substance use.

The data showed a greater number of women, with a partner and higher education. Similar results were identified in national[16] and international[17,18] research. In addition, it was identified that 39.7% of the participants had depressive symptoms, similar results were found in a Chinese study (30.8%)[16] and in Bangladesh (40.1%)[17].

The high prevalence of depressive symptoms in older people is an alert for health professionals, including nurses, since their identification during the evaluation aims, in addition to identifying them early, to recognize the associated risk factors, promote mental health in this population and, consequently, reduce the incidence of diseases[18].

In relation to marital status, older people with partners had a lower score of depressive symptoms. Similar results were identified in a population-based study carried out in southern Brazil, in which the factors associated with the occurrence of depression among older people were being female, being separated and being widowed during the pandemic[16]. However, this association, before the pandemic, was already a concern, as identified in the study carried out with 388 older people in Mato Grosso[19].

The older person who does not have a partner experiences, in the aging process, continuous losses that can lead to negative feelings, such as discouragement and sadness. In addition, not having consolidated social support influences the emergence of depressive symptoms[20], which can be aggravated by social isolation during the pandemic.

In the study, it was identified that older people presented some psychological symptoms such as hopelessness, fear of dying and desire to die, which significantly increase the risk of the older person to

develop depressive symptoms. With the beginning of the COVID-19 pandemic, there were measures, such as social isolation, to prevent the infection and spread of the virus, which brought great concern regarding the emotional state of older people due to the sudden interruption of their activities[21].

In a study carried out in Nepal with 847 older people, the authors identified that the factors associated with fear of getting sick from COVID-19 were: being considered older, having comorbidities, receiving fake news from the media and social networks, having a lot of concern, feeling overwhelmed and hopelessness for the advancement of the disease[22].

Studies carried out in Brazil, which investigated depressive symptoms in older people in the city of São Paulo[23] and Rio Grande do Sul[24], reported that these symptoms in older people are associated with factors such as impaired quality of life, worse sociodemographic conditions and increased risk of mortality.

The media played a central role in disseminating information about infection, death rates from COVID-19 and vaccination, making people more concerned and resulting in adverse psychological effects[25]. Measures such as social distancing and quarantine have reduced access to mental health services for the population, especially older people, causing an increase in fear, uncertainty, anxiety and anguish during the pandemic[26]. Furthermore, the misinformation surrounding COVID-19 - ranging from a false and misleading narrative of the Chinese virus to the use of disinfectants to cure COVID-19 - affected the mental and physical health and well-being of people[25].

An association was found between depressive symptoms and physical symptoms, such as tremor and tiredness. A study carried out with 145 older people found that 65.5% had depressive symptoms and were influenced by tiredness, fear of bad things happening and memory problems[27]. The presence of depressive symptoms can cause a mental disorder that can be accompanied by sadness, loss of interest or pleasure, feelings of guilt or low self-esteem, disturbed sleep or appetite, feeling tired and lack of concentration[28].

Tiredness is the most prevalent symptom in the presence of depression and about 78% of patients report daily levels of this symptom. In healthy individuals, subjective tiredness has a distinct diurnal time trend: a V-shaped pattern where levels decrease from morning to noon and increase continuously until reaching a peak in the late evening[29].

Another associated physical symptom was the presence of tremor in the older person during the COVID-19 pandemic. Functional tremor is a more common movement disorder and is diagnosed by confirmation of entrainment or total suppression of oscillatory activity, distraction, co-activation or co-contraction signal, tremor pause during contralateral ballistic movements, and variability in tremor frequency, axis and/or topographic distribution[30].

One study identified that the presence of functional tremor was associated with the presence of depressive symptoms with activation in the right cerebellum compared during the motor task, increased activation in the paracingulate gyrus and left Heschl gyrus during the basic emotion task that identifies sad faces[31].

Regarding the use of psychoactive substances related to the manifestation of depressive symptoms, in the study, not using illegal substances proved to be a protective factor in older people. A survey conducted in Brazil on the use of psychoactive substances during the pandemic found that of the 1,145 participants, 32% said they had started using psychoactive substances during the COVID-19 pandemic. It is a consensus that the consumption of illegal substances stimulates the appearance of mental illnesses in the user, as it leads the person to lose control over the will, starting to use the psychoactive substance in a compulsive way[32].

Social isolation due to the pandemic, forced retirement, the loss of loved ones due to the disease, as well as changes in income are considered factors that increase the risk of the older person using psychoactive substances, according to the National Institute on Drug Abuse, while consumption increased from 3.4% to 7% between 2012 and 2018[33], in this sense, these factors must be identified in this population and care should be promoted by the health team to identify the risks of mental health

changes, through constant evaluations in the inter and multi-professional teams.

In addition, with the beginning of the pandemic, cases of stress increased, causing a physical and mental impact on the health of the population. However, older people who used these substances were more likely to relapse or increase their use[34].

The study has limitations, such as not being representative in the city of São Paulo due to the use of the snowball technique, which does not allow inferring the results for the older population that lives in the city. In addition, the use of electronic means to fill in the information led to a differentiated sample when compared to other studies carried out in the older population. However, the findings presented will direct the geriatrics and gerontology professional to reflect on the importance of promoting and maintaining older people's mental health in the post-pandemic, contributing to healthy and active aging.

CONCLUSION

The results presented in this study demonstrate that, during the COVID-19 pandemic, older people presented depressive symptoms associated with different factors, which aroused in people the fear of dying, of losing a friend or a loved one and that provoked feelings of hopelessness in some people, making them feel like no longer living.

These psychological factors were also expressed through physical symptoms associated with depressive symptoms, as mental changes have symptomatic repercussions of a physical nature, such as the presence of tremors and tiredness. In addition, the results obtained are reinforced by studies that assert the association between the use of substances, such as psychotropic medication, and the manifestation of depressive symptoms in older people for the maintenance of mental health.

Therefore, the study contributes to a better understanding of the effects of a pandemic such as COVID-19 regarding the psychological and physical aspects expressed by the older population in the process of coping with this context. However, it is necessary for the health professional to pay attention to any early signs or symptoms that may indicate some indication of mental alteration in older people, which is important for the promotion of mental health in this population.

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Original Articles

1 of 11

Vulnerability of institutionalized older people and social support in the perspective of the COVID-19 pandemic

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Abstract

Objective: Discuss covid-19 prevention measures in the context of the vulnerability of institutionalized elderly people and analyze the social support offered to Long Stay Institutions for the Elderly during the pandemic. *Method:* Qualitative research carried out with workers from 24 philanthropic institutions in Rio Grande do Norte. The concepts of vulnerability in health and social support supported the organization and discussion of data submitted to thematic analysis. *Results:* The institutions partially adopted the prevention measures recommended by the National Health Surveillance Agency, in evidence: cancellation of visits, use of Personal Protective Equipment and cleaning of environments. For the most part, institutions prioritized the control of viral transmission, putting the reduction of socio-psychological impacts related to social distancing and isolation in the background. Measures not recommended and without scientific evidence were observed, such as the use of ivermectin. Also, the performance of social assistance and health networks was carried out in a more integrated way, improving the social support offered to institutions in the perspective of the pandemic. The Unified Health System stood out for its sanitary recommendations, supply of supplies and attention from the Family Health Strategy, while the Unified Social Assistance System acted in a less expressive way. *Conclusion:* In general, the measures adopted were insufficient to prevent covid-19 in view of the susceptibilities of institutionalized elderly people. Although the pandemic has expanded the social support network and the visibility of Long-Stay Institutions for the Elderly, greater investments by the government are necessary to effectively reduce the vulnerability of these elderly people.

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INTRODUCTION

In the context of the COVID-19 pandemic, a disease declared a Public Health Emergency of International Concern[1], people over 60 years of age represent one of the highest risk groups for the most severe forms of the disease, hospitalizations and deaths[2-4] due to the presence of comorbidities and weaknesses in the immune response[2-3]. In Brazil, two years into the pandemic, epidemiological data indicate that approximately 75% of deaths from COVID-19 were older people[5].

The numbers are even more expressive when it comes to institutionalized older people. Data from 21 countries in North America, Asia, Europe and Oceania account for 421,959 deaths by February 2022[6]. A study carried out in Long Term Institutions for Older People (LTIE) in 14 Brazilian states, involving almost 60,000 older residents, found that in the first six months into the pandemic, the incidence of the disease in the institutions was 6.57% and the lethality was 22.44%[7].

Given the above and the recommendations for social distancing and isolation introduced by COVID-19[8], measures to control the transmission of the virus and strategies aimed at mitigating the social and psychological impacts of the disease become indispensable for the protection of health and quality of life[9-10] of older people. In this sense, the conceptual foundations of vulnerability in health and social support are relevant, as they help to understand how relationships are established between institutionalized older people, the LTIE and society to produce measures to cope with the pandemic. In addition, these relationships adapt to the promotion of security and dynamic social exchanges, valuing the potential of older people and strengthening their contributions to the environment in which they live.

Aging, a continuous process of individual development, increases vulnerability in health due to organic, functional and psychological changes, which involve individual and social aspects that influence the way of living[11]. Understanding this vulnerability in old age is important to understand the social effects of loneliness, exclusion and prejudice, as well as to measure quality of life and susceptibility to illness or disease[12]. In this way, protecting the health of institutionalized older people during the COVID-19 pandemic goes beyond belonging or not to risk groups, and can be expanded when situations of vulnerability are considered in three dimensions: individual, social and programmatic[13].

In relation to the individual dimension, the physiological aspects, the way of life and the motivation of the older person are considered to understand the illness and the control of its determinants. The social dimension points out the sociocultural aspects and the political, economic and accessibility conditions of the older person. And, the programmatic dimension refers to the systematic efforts that public authorities and social institutions make to stimulate transformations in the performance of care[13].

The concept of social support is also considered essential because it refers to a type of interaction, expressive or instrumental[14], in which the subject feels valued, cared for and part of a wide support network, which is formed by the relationships of trust, community support and civil society, as well as public institutions and services[14-15]. Social support is, therefore, a construct that satisfies the subject's daily needs[16], minimizes the effects of stressors in crisis situations and also provides benefits for people's daily lives[14-15].

Therefore, we bet on the articulation of these two concepts with the aim of discussing COVID-19 prevention measures in the context of the vulnerability of institutionalized older people and analyzing the social support offered to Long Term Institutions for Older People during the pandemic.

METHOD

With a descriptive, exploratory and qualitative approach, this research was carried out by intentional sampling, considering all LTIE of a philanthropic nature in the State of RN, registered in the Unified Social Assistance System (SUAS) and/or recognized by the Health Surveillance.

Data collection took place in June 2020, during the COVID-19 pandemic. The LTIEs were clarified

about the purpose of the research and received the semi-structured questionnaire by institutional e-mails and also by the personal and/or institutional telephone of managers and technical managers. The institutions were instructed to respond in written or spoken form (through audio) and to send the answers by e-mail or by telephone, via Whatsapp. To ensure data security, the survey information and the questionnaire were sent by only one sender and, equally, the responses were received through the same channel.

The semi-structured questionnaire was defined with the questions: 1- What measures does the LTIE take to protect older people from COVID-19? 2- How are the Social Assistance Secretariat and/or the services of the Unified Social Assistance System (SUAS) contributing to the LTIE during this period of COVID-19? 3- How are the Health Department and/or the services of the Unified Health System (SUS) contributing to the LTIE during this period of COVID-19?

The subjects were selected according to the following inclusion criteria: being a manager or administrative technician or health professional at the institution, as they are responsible for managing health demands and needs during the pandemic; be at the service of the institution with a workload formalized by contract or volunteer term; and, having self-declared experience in the routine practice of difficulties, conflicts and potentialities involved with the care of institutionalized older people. Subjects who sent incomplete questionnaires or after the deadline established by the research were excluded.

The answers were transcribed and analyzed using the thematic analysis method[17]. Based on theoretical assumptions, research objectives and the concepts of social support and health vulnerability, the floating reading of the data allowed the identification of units of meaning[18], which were graphically represented through two word clouds and testimonies of subjects organized into three categories of analysis. This process was initiated by the main researcher and, later, submitted to peer review and to the conclusion of the data interpretations by the other authors.

This research followed the ethical norms and was approved by the Research Ethics Committee with opinion of CAAE nº 03093418.6.0000.5292. All agreed to participate by signing the Free and Informed Consent Term.

RESULTS

Of a total of 27 identified LTIEs, 24 participated in the study, with two losses due to lack of responses within the established deadline and another loss due to incomplete questionnaire submission. The participating institutions were: 12 private, philanthropic of a religious nature (50%); 12 private, non-religious philanthropic (50%). Regarding the operating regime, the LTIEs represented: 8 open (33.3%); 12 semi-open (50%); 4 closed (16.7%).

The testimonies of all subjects were organized according to units of meaning that were graphically represented through two word clouds. In Figure 1, it is observed that the participating LTIEs followed the main recommendations presented in technical notes from the Ministry of Health and the National Health Surveillance Agency (ANVISA), whose publications are all referring to measures for the prevention and control of COVID-19 infections[19-20].

The "cancellation of visits" to the LTIE and the "use of Personal Protective Equipment (PPE)" were the most mentioned measures by 16 institutions. The first is related to other nuclei of meanings that describe the social isolation defined, worldwide, by government bodies, namely: cancellation of tours and activities; interpersonal distancing; avoid agglomeration; and, social isolation. The second inference highlighted is a measure inherent to the prevention of COVID-19, since the mode of transmission of the disease has universalized the requirement to use, at least, masks by the entire population for individual protection.

It is noteworthy that some meaning nuclei were smaller in the word cloud because they were mentioned by few LTIEs. Some terms in Figure 1 were mentioned only once by different LTIEs, such as: food reinforcement with juices, teas and fruits; sunbath; vitamin supplementation; objects and clothes for individual use; and, recreational activities. Other terms are worth mentioning because they constitute measures adopted without health recommendations

and without scientific evidence[21], such as the use of ivermectin and vitamin supplementation.

The concreteness of prevention strategies and compliance with government recommendations are made possible by the commitment of the LTIE.

However, facing problems of a more complex nature requires a broader and more effective social support network, in which the engagement of the population and public sectors becomes indispensable. In this sense, Figure 2 depicts the LTIE's testimonies about the support received.
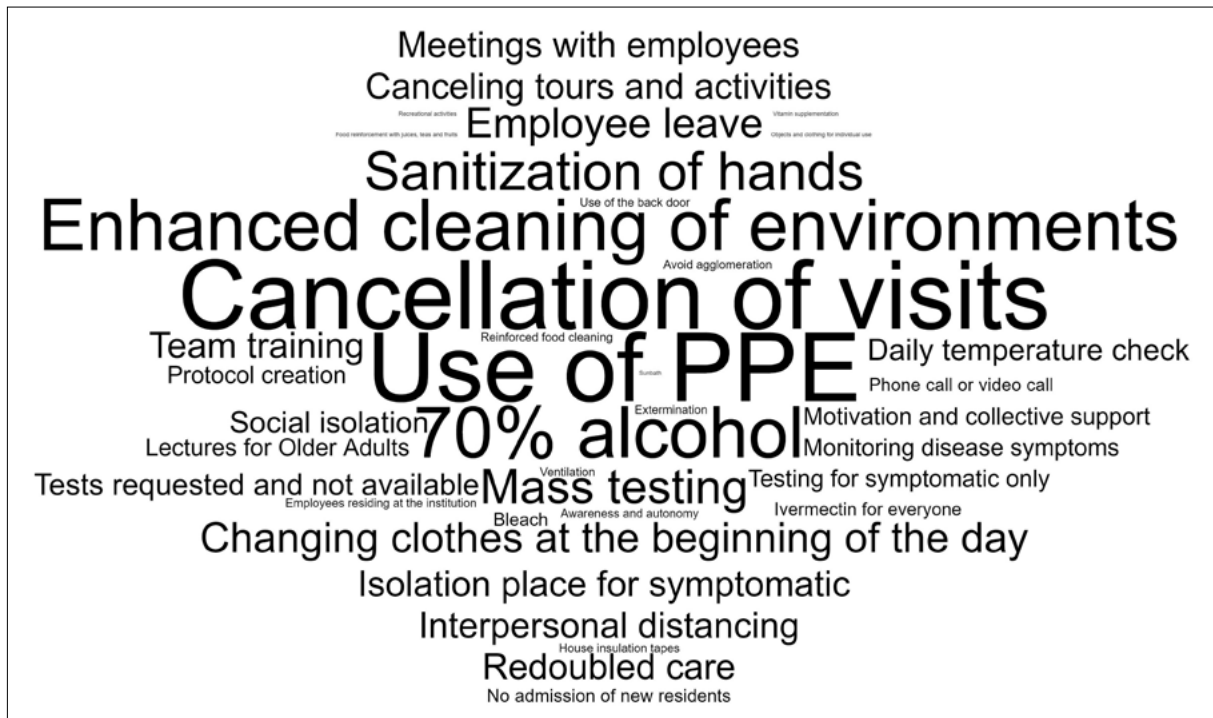
Figure 1. Measures taken by institutions to protect the health of older people during the COVID-19 pandemic. Rio Grande do Norte, 2020.
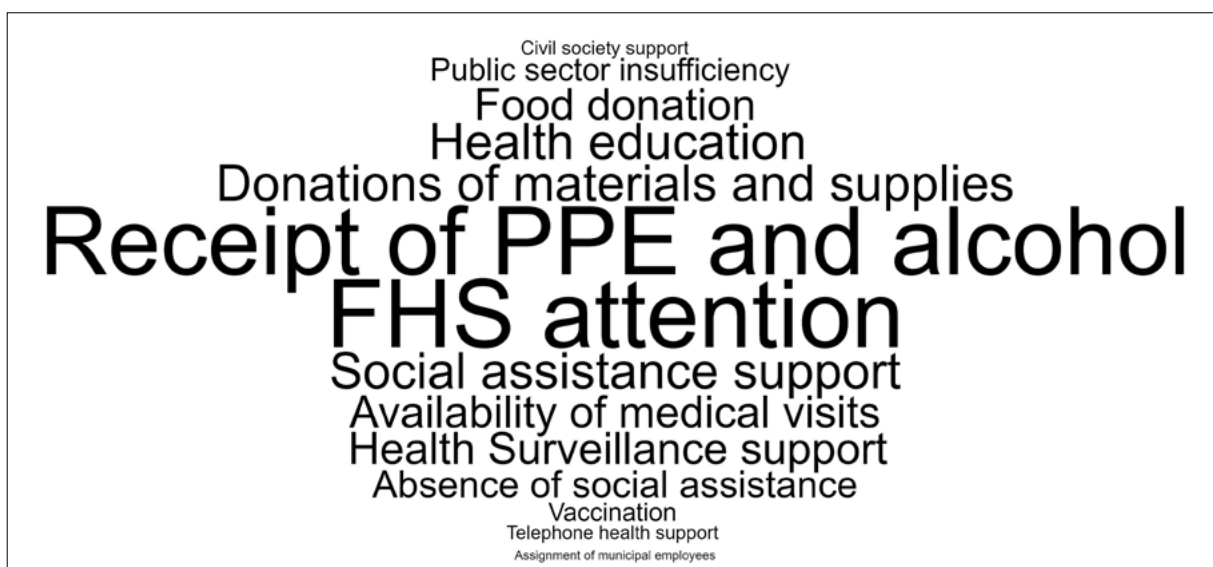
Figure 2. Social support offered to institutions by social and health care networks during the COVID-19 pandemic. Rio Grande do Norte, 2020.

Responding to the contributions made by the SUAS and SUS public services, among the 24 participating institutions, 15 of them referred to the "receipt of PPE and alcohol" and, equally, 15 of them referred to the "attention of the Family Health Strategy (ESF)". In relation to Figure 2, only one nucleus of meaning had less graphic visibility, which was the "assignment of municipal employees", since it was mentioned by only two LTIEs, which assigned workers in order to contribute to the care offered to the institutionalized older people.

In addition to the word clouds, the analysis grouped by themes was also carried out through the responses that emerged and stood out in the face of the investigated phenomenon[17]. Thus, the subjects' discourses were arranged in categories inspired by the three axes of understanding of reality, proposed by the conceptual framework of vulnerability: individual, social and programmatic dimensions[13].

Individual dimension: the senile body craves autonomy and empowerment

For physiological reasons related to aging, older people are more susceptible to COVID-19, which was expressed in the speeches of the research participants, demonstrating their concern in carrying out disease control in the LTIE in view of the high numbers of cases and deaths among institutionalized older people.

> "We work with flexible [frail] older people. And we cannot be exposing [them] right now" (LTIE 2).

> "Seventeen older people tested positive. With three deaths and the other fourteen already cured" (LTIE 9).

To protect the older people and control the transmission of COVID-19, the creation of measures to disseminate information about the disease was motivated, including, as a target of actions, employees and family members of residents.

> "Meetings were held with employees to pass on the importance of wearing a mask and hand hygiene, avoiding crowds and changing clothes when they arrive at the facility" (LTIE 1).

> "We made a memo with the list of preventive measures that we are doing in the house [...] to make our employee aware, [...] together with the family" (LTIE 2).

Some LTIEs have developed protocols or technical notes to inform and emphasize the role of the worker in preventing COVID-19 and maintaining the health of residents, favoring routine care and minimizing the feeling of helplessness and anxiety of LTIE workers[22].

The feeling of fear of finitude among older people was present in the LTIE, stimulated by the deaths that occurred within the institutions themselves, being the object of attention of the workers.

> "[...] We have a lady that we know passed away from COVID. We didn't want to warn our residents so as not to generate tension. We'll leave it for later" (LTIE 14).

In addition, the importance of the bonds established from the pandemic context was perceived, which were evidenced as essential in the fight against individual vulnerabilities.

> "This is a lesson in people's lives. The people came closer. The shelter hardly receives visitors here in the city and something like this brought social action a lot closer" (LTIE 24).

In contrast to the susceptibilities of an organic nature that affect older people and the increased fear of death, the acquisition of information about the disease, the new forms of interaction and recommended virtual communication[23] proved to be essential in reducing individual vulnerability.

Social dimension: institutionalized living strengthens care

With the advent of COVID-19, challenges emerged in the performance of care in LTIE, due to the expansion of care required by the pandemic scenario and the routine difficulties faced by institutions. Thus, the responsibility of workers and social supporters has increased in the care of older residents.

"It is more an institutional issue than anything else, we have to take care of ourselves in the way we can" (LTIE 3).

In addition, other specific adaptations to the prevention of COVID-19 were also made, according to the recommendations of the health authorities[19-20], which was demonstrated in the following speech and listed in the cloud of Figure 1.

"We redoubled the hygiene of bathrooms, leisure area, handrails, living room, mattresses, cafeterias, we also reinforced the use of hand sanitizer [...] and a sink at the entrance of the institution for hand hygiene with liquid soap" (LTIE 11).

Social distancing has been widely adopted to block the transmission of COVID-19. However, older people can understand on the other hand: loneliness and abandonment by family members[22]. In this bias, the suspension of visits, reported by the LTIE and guided by ANVISA, can harm the mental health of older people. They may present reactions of anxiety, fear, anguish, loneliness and annoyance, which lead to changes in sleep and appetite habits[24], as corroborated by the statements of LTIE workers.

"Suspension of visits, with contact with family members made possible by audio or video call" (LTIE 2).

"We try to make video calls regularly, both individually and collectively" (LTIE 14).

The use of digital technologies for interactions between older people and their family and friends was recommended and followed in the prevention of COVID-19. The relevance of social media was perceived, as they promoted virtual contact and maintained affective bonds[24]. In pandemic scenarios, older people must remain active and the LTIE must encourage them to practice tasks during this period of social isolation[20,24], in order to strengthen bonds inside and outside the institution.

Programmatic dimension: multisectoral support promotes health transformation and protection

Several difficulties in facing the pandemic were presented by the LTIE, due to the financial limitation for the acquisition of inputs, as well as the lack of professional qualification linked to the adequate management of the cases.

"So we try to overcome the difficulties. Also with this support from the civil sector, from people who really like to help the shelter" (LTIE 3).

"We did not have training from the Health Secretariat, we were not presented with a measure of cases" (LTIE 11).

Even in the face of the acute scenario experienced at the beginning of the pandemic and the requests made to the municipal health management to solve the problems, the research participants highlighted the insufficiency of diagnostic tests in the LTIE, which would serve for laboratory screening using tests capable of detecting the presence of the virus (RT-PCR) and/or antibodies against the virus (rapid test)[25].

"Two employees away, we have two older people with a fever for more than two days, but the unit says they have few tests and the symptoms do not qualify for testing. Will the first case have to die for the older people to be tested? We keep asking, talking and unfortunately they don't do anything" (LTIE 11).

Despite the funding intended for intersectoral support[26], the concreteness of the integrality of the SUAS and SUS services is still a challenge, as expressed in the speeches and in Figure 2, where the absence of social assistance and the insufficiency of the public sector were reported.

Eight LTIEs were identified as actively searching for COVID-19 cases with mass testing. Some LTIEs

found it difficult to carry out this measure due to a lack of multisectoral support. It is noteworthy that four institutions performed the test only on symptomatic older people and/or workers and another five institutions requested tests from the municipal health departments and were not available, causing feelings of anxiety and concern.

The transformation of routine during the pandemic was possibly made possible by the LTIEs themselves. But, according to the wishes expressed in the testimonies, the institutions need more forceful support from the public power to overcome economic and structural barriers.

> "We are seeing with this coronavirus that the financial situation has worsened. If we receive help, it is supplies, protection aid, etc. But not financial" (LTIE 14).

> "Alert to the financial sector about the increase in the acquisition of PPE's and some inputs" (LTIE 18).

> "The health secretariat sent a nursing technician to assist in the isolation area" (LTIE 9).

Programmatic efforts should make it possible to replace workers or transfer others from intersectoral public services[20,25], in addition to reinforcing social monitoring, technical and health visits and even other systematizations, such as support in the adaptation of rooms or provisional assignment of places to welcome and isolate older people sick with COVID-19.

> "A big team came to do 56 tests. There were five residentes and one employee contaminated. Without feeling anything. We immediately provided isolation, the City got us a house" (LTIE 24).

> "Measures were taken, such as adapting a room for isolation, if COVID-19 is suspected" (LTIE 21).

Finally, the importance of building the contingency plan for each LTIE was observed, with adaptations to the demands and structural and cultural peculiarities.

DISCUSSION

LTIEs have challenges in institutionalizing older people, even more so in the face of the COVID-19 pandemic, whose social distancing is one of the main forms of prevention, even where they live collectively. Within the scope of the individual dimension, although it has no direct connection with illness, aging is accompanied by physiological changes that progressively make the individual more susceptible to diseases[27]. In particular, comorbidities and greater functional dependence of institutionalized older people led, in synergy with SARS-Cov-2 infection, to a higher morbidity and mortality rate in LTIEs[25].

If the physiological factors are often difficult to modify, on the other hand, the cognitive and behavioral aspects of individuals are more easily manageable[13], which can empower the older person to self-care in the prevention of COVID-19. In this sense, clinical and scientific evidence assume a prominent role so that the individuals can protect themselves and mobilize themselves against structural conditions that make them susceptible to illness[13]. Quality information about the disease is also necessary in the pandemic context, so that LTIE professionals can adequately recognize the vulnerabilities of the older people and, above all, act in health protection beyond the walls of the institution[28]. The dissemination of information favored the prevention of COVID-19 in the care of the older residents.

Still in the individual context, the fear of death was something relevant. The way in which temporality and death are viewed depends on the cultural and singular references of the older person[28]. The experience of death and mourning can contribute to the formation of an ideology linked to the preservation of life. On the other hand, the denial or lack of communication of the death of close ones, as perceived in the speeches of the participating subjects, can remove from the older person the stage of coping with grief and even the awareness and appreciation of self-care about the health-disease process. There was no management policy for this problem in the investigated reality, which should be the object of greater institutional investments.

On the other hand, strengthening bonds proved to be important. The impossibility of psycho-affective relationships in person, due to the indulgence of social isolation, expanded social support in the LTIE, favoring opportunities for listening, welcoming, empowering and encouraging the older person to self-care with the dissemination of preventive behaviors.

In terms of the social dimension, it is understood that coping with a health-disease process depends on material, cultural, political and moral aspects that concern life in society[13]. This is equivalent to older people who have a specific way of living and coexisting when they are institutionalized.

The pandemic scenario has increased the vulnerability of older people, even when not affected by the disease. It should be considered that, historically, emerging situations in public health sometimes generate stigma and discrimination against risk groups or more susceptible people[29], which occurred at the beginning of the pandemic. Added to the prejudices that affect aging, such as ageism[30], this context has changed the routine of the older residents by compelling them to distance and social isolation, reviving feelings and psychological repercussions of adaptation to a new condition[31]. However, it was seen that reducing vulnerability to face COVID-19 is possible in institutionalized living, depending on the social commitment of the LTIE and the effectiveness of care provided.

In the programmatic dimension, it is considered that the LTIE should analyze what are, at any given moment, the resources available to intervene in the illness caused by COVID-19, through strategies that allow reconstruction and social transformation[32]. Likewise, in order to maintain comprehensive and longitudinal care for residents, interdisciplinary and multisectoral interventions are indispensable and, in emergency situations, social support is even more necessary.

In the midst of institutional challenges and difficulties in dealing with COVID-19, important initiatives were taken to integrate social and health care networks, which culminated in greater attention from the ESF to the LTIE, resulting in the active search for patients, risk assessment, coordination of care in identifying signs, symptoms and clinical severity of COVID-19[19].

In addition, as already discussed in the individual dimension, the importance of access to information by everyone, including the older people and workers, in carrying out health care is highlighted. The support of the government, the interest of the LTIE in the acquisition of means of communication, such as the internet, and the implementation of communication strategies proved to be essential. Information is essential for controlling risks, reducing vulnerabilities and overcoming the economic, political and cultural obstacles that sustain the lives of older people. However, the experiences of disinformation and infodemics that accompanied the pandemic reveal that informational strategies and policies should focus not only on access, but also on the quality of information[33-34].

Therefore, the three dimensions of vulnerability are interrelated: more general social aspects impact institutional efforts and individual possibilities for reducing vulnerability, as well as individual transformations and initiatives are dependent on and influence institutional and social scenarios.

In this sense, it is important to emphasize how social support contributes to maintaining the health of the older people and LTIE workers, who are exposed to situations that trigger physical and emotional exhaustion, mainly due to the fear of getting sick and transmitting the disease to family members and residents. Protective and social isolation actions were guaranteed by the institutions and should continue whenever recommended by the health authorities, aiming to control the transmission of the virus, even with all the older people and workers immunized by vaccination.

As a limitation of the research, it is observed that the virtual format of data collection may hamper the participant's comfort and confidence when sharing information and, occasionally, may have weakened the quality of the responses. Also, sending audios does not guarantee a private environment that provides reliability in the testimony and, mainly, sending written responses also does not ensure

adequate analysis of the speech, either because of lack of expression in the intonation of words, or because spelling is saturated with language vices. However, given the impossibility of face-to-face meetings due to the need for social isolation, especially in the LTIE environment, the importance of virtual data collection is highlighted to enable research in a timely manner, even at the beginning of the pandemic, avoiding a possible memory bias.

CONCLUSION

In view of the recommendations against social agglomeration and the scientific evidence on the greater susceptibility of the older people to the aggravation of COVID-19, the established context highlighted the essential role of public health and social assistance systems (SUS and SUAS) in protecting older people. In addition, the reality during the pandemic has somehow increased the visibility of LTIE and institutionalized older people, creating a social support network, which was not well integrated in the past, made up of family members, the community, public authorities, social assistance and health services and, above all, by the LTIEs themselves.

Nevertheless, the difficulties still faced to implement the recommended health measures - which translated into expressive indicators of morbidity and mortality in the LTIE - showed that the efforts made were insufficient for an adequate prevention of COVID-19, while revealing the chronic Brazilian problems, such as the underfunding of those public systems.

Therefore, greater investments by the government in LTIE are necessary, enabling effective transformations and reduction of vulnerabilities of institutionalized older people in the individual, social and programmatic dimensions, as well as investments in research that can help public managers in the coordination of health crises.

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Original Articles

1 of 11

Effects of remote home-based exercise program on functional capacity and perceived loneliness in older adults during COVID-19 lockdown

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Abstract

Objective: to determine the effects of a simple home-based exercise program on functional capacity and perceived loneliness of older adults in lockdown due to the COVID-19 pandemic. *Method:* Twenty-nine volunteers were randomly divided into two groups: (1) control group (CG); and (2) home-based exercise group (HBEG). Lower limb muscle strength, functional capacity, and perceived loneliness were assessed at baseline (pre-test), 4 weeks, and 8 weeks (post-test) using the Chair Standing Test (CST), Gait Speed Test (GST), Timed Up and Go test (TUG), and Perceived Loneliness Scale (PLS). *Results:* The number of repetitions on the CST differed statistically between the groups (CG vs. HBEP, $p=0.006$) and among timepoints (Pre *vs.* 4W *vs.* 8W, $p=0.043$.). In the CG group, TUG test completion time was statistically lower at baseline than at 8 weeks ($p=0.021$) (pre 12.0 ± 5.9 s vs. 8W 12.7 ± 6.5 s). There was no statistical difference in TUG time in the HBEG. No statistical differences were found on the GST and PSL between groups or among timepoints. Conclusion: The home-based exercise program improved general functional capacity after 8 weeks of training, but perceived loneliness and gait speed were unchanged in the older adults experiencing lockdown due to the COVID-19 pandemic.

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INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the coronavirus strain that causes coronavirus 2019 (COVID-19). The virus was first reported in December 2019 in Wuhan, China, rapidly spreading around the globe thereafter. In late January 2020, the World Health Organization declared the COVID-19 outbreak a public emergency of international concern and, in early March, went on to declare the disease a pandemic[1].

The majority of epidemiology experts maintain that the most effective way of controlling the rapid spread of COVID-19 (China and other locations) is for government authorities to quickly implement robust lockdown measures (Jiménez-Pavón et al. (2020)[2]. Numerous countries adopted different degrees of lockdown restrictions. Countries such as Italy, Spain, the United Kingdom, the United States of America and Brazil only started implementing social distancing strategies several weeks after the outbreak, resulting in rapid spread and high incidence rates of COVID-19. Based on the latest guidance regarding the COVID-19 pandemic, older adults and individuals with hypertension, diabetes, cardiovascular and respiratory diseases are identified as being at higher risk of contamination and death[2-4,]

Although lockdowns measures seem to be the best option to prevent the fast spread of infections caused by the COVID-19, there are adverse health consequences for individuals in lockdown, especially the more vulnerable and at higher risk, such as older adults[5]. In this phase of life, individuals are more exposed to the physical limitations, loss of social support and more severe perceived loneliness associated with aging[6,7]. Anxious symptoms, depression, hypertension, obesity, sleep disorders, cardiovascular diseases, decreased physical activity levels, and decline in functional capacity are more common in this population, as reported by researchers[5-7]. Lockdowns can lead to older adults becoming even less active, spending more time engaging in sedentary lifestyle and low-energy expenditure activities (i.e., sitting, lying, reading), exposing them to greater risk of disease.

In addition, lack of physical activity over time reduces the mechanical load applied to the musculoskeletal system. This situation can accelerate muscle mass loss, resulting in sarcopenia, frailty, and comorbidities.

There is no doubt that the older adult population is the most impacted by lockdown restrictions, and this group will be the last to resume their normal daily routines. Since lockdown is a necessary measure, finding alternatives to promote and/or maintain health in older adults is critical to minimize problems in the future. One of the most efficient, cost-effective, straight-forward and safe ways of tackling the health issues caused by the COVID-19 pandemic is physical activity[8]. Physical activity is considered a non-pharmacological tool recommended as primary prevention, treatment, and control of associated risks for developing chronic diseases and mental health issues[9-11]. Physical activity also plays a vital social role in building social connectedness, friendship and trust among participants[12]. Furthermore, physical activity guidelines for older adults help to decrease the incidence of chronic diseases, diabetes, cancer and excess body fat, and to improve or maintain strength, muscle mass and functional capacity, while also lowering risks of falls and cognitive decline (WHO, 2020)[12].

Since the pandemic, protective measures have forced older adults to stay at home in lockdowns, making remote home-based exercise routines important to avoid the deleterious effects of a sedentary lifestyle on health and well-being. Furthermore, access to exercise equipment within the home tends to be very limited. Therefore, studies determining the impact of lockdown measures associated with the pandemic on fitness levels and exploring how remote home-based exercise programs might minimize losses in functional capacity and perceived loneliness in older adults become imperative[13].

The aim of the present study was to determine the effect of a simple, accessible, low-cost, short-term home-based exercise program on functional capacity and perceived loneliness in older adults during Covid-19 lockdown.

METHOD

Participants undertook the present study within their homes. Prior to the study, and after the principal investigator had clarified all of their questions and concerns, all participants signed an informed consent form approved by the University of Sao Paulo, School of Arts, Sciences and Humanities Institutional Committee of Ethics in Human Research (protocol CEP-EACH/USP 74029), observing CNS resolution 466/2012.

Participants

Participants from the University Hospital at the University of Sao Paulo Medical Center including older adults enrolled on the University of Sao Paulo Senior Program, São Paulo, Brazil, were recruited using social media platforms. Older adults with dementia, psychiatric disorders, cognitive impairment, stroke, and visual or hearing deficits were excluded from the current study. Healthy older adults with independent mobility and no cognitive impairment (mini-mental assessment) were included in the study sample. A duly trained gerontologist collected the study information during an online interview with participants using a standard medical and health screener to ensure participants matched the eligibility criteria.

Participants were instructed to wear comfortable clothing and shoes, perform the test on a non-slip hard surface with sufficient space to allow for the correct execution of movements. None of the participants were in use of assistive devices. Although the tests were self-administered at home, a family member or caregiver was present at the time of the test in case any unforeseen safety issues arose. Participants were also instructed to refrain from consuming alcohol, caffeinated beverages or engaging in vigorous exercise for the twenty-four hours leading up to testing.

According to the sample size calculation (G*Power software, Heinrich Heine University,

Dusseldorf, Germany), the minimum sample size required was 30 participants, considering a beta of 0.8 and alpha < 0.05 (95% confidence interval (95% CI) and maximum error of 2%). A total of 84 older adults contacted the researchers via telephone and digital platforms to volunteer for the study. After eligibility criteria analysis, 29 participants were enrolled in this cross-sectional, randomized controlled quantitative study. Participants were randomly assigned into two groups: (1) control group (CG), not engaged in any physical activity; and (2) home-based exercise program (HBEP) group. Both groups completed functional capacity and loneliness assessments at pre-intervention, week 4, and week 8 (Figure 1).

Experimental Design

This study hypothesis was tested by randomly assigning older adults into two groups (CG and HBEP groups). Participant assessments were executed alone (self-assessment) without in-person face-to-face instructions and interactions due to government restrictions (i.e. lockdown rules). Participant assessments were self-administered and remotely supervised (online). Prior to testing, participants received recorded instructional videos on how to set up and execute the tests by email or via other digital platforms. In the event of questions or concerns, participants contacted the researchers directly by phone, text message, or video chat. In addition, the older adults remained in their homes throughout the study period.

Anthropometric Assessments

Body mass was measured using scales accurate to the nearest 0.1 kg (W200A-LED, Welmy, Sao Paulo, Brazil), and height was measured using a stadiometer accurate to the nearest 0.1 cm. Body mass index (BMI) was obtained by dividing body mass (kg) by height (m) squared (BMI = body mass (kg)/height (m²)). These measures were already contained in the medical records.
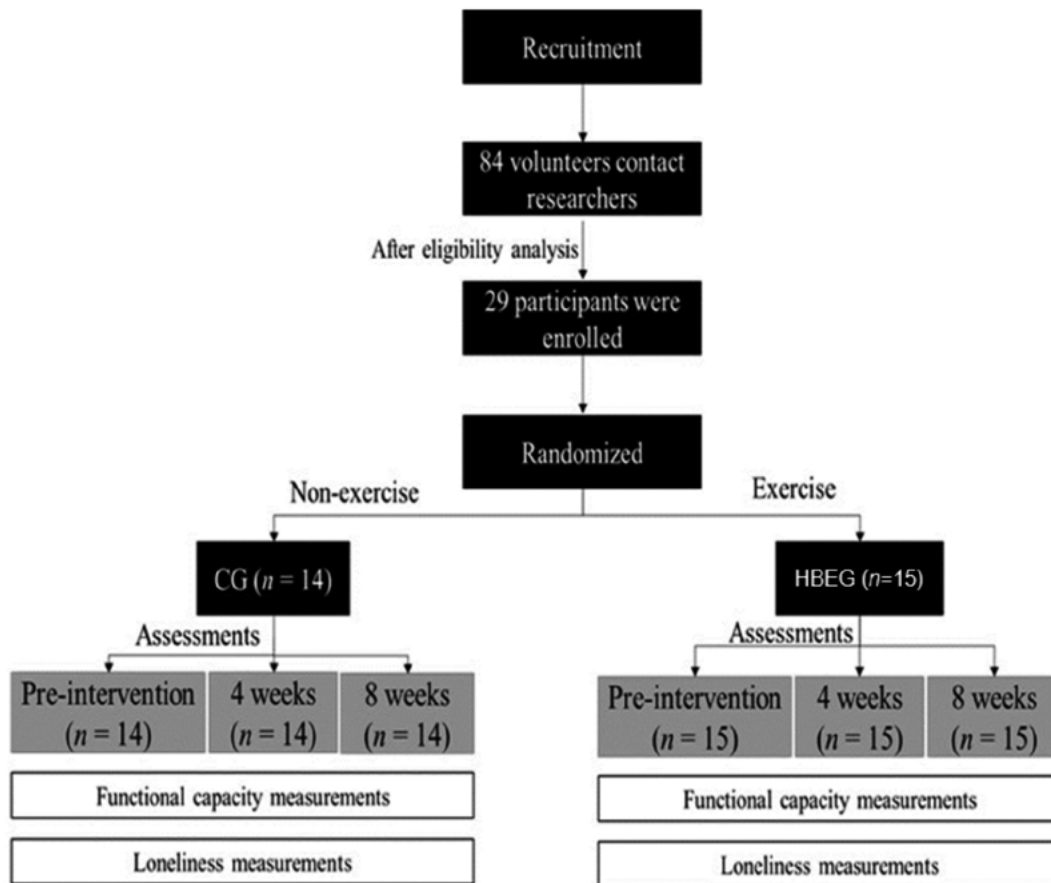
Figure 1. Flow diagram illustrating process of participant selection for the experimental study. São Paulo, Brazil, 2021.

Pre and post-intervention Assessments

Chair Stand Tests

The Chair Stand Test (CST) is part of the Senior Fitness Test Protocol to assess lower limb muscular endurance and strength[14]. The CST protocol consisted of 30 seconds of repeatedly sitting and standing up from a 43cm-high straight-back chair with no armrests, placed against a wall or stabilized for safety. Participants' started in a sitting position centrally in the middle of the seat with their feet flat on the floor and shoulder-width apart. Arms were kept close to the chest and crossed at the wrists. From a sitting position, participants stood upright and then returned to the sitting position, repeating this cycle for 30 seconds. Participants reported the total number of completed repetitions executed as their final score.

Gait Speed Tests

The gait speed test (GST) was used to assess gait speed of the participants. To perform this test, each individual was instructed to place a mark with tape on a flat floor surface. The start and endpoints were 4.5 meters apart (test zone) with 50 cm before and after the defined distance allowing for acceleration and deceleration. Participants started walking at their usual pace, and the time taken to complete the 4.5 meters was recorded as their final score. Gait speed was expressed in meters/second ($m.s^{-1}$). GST results are associated with attributes of general health status as an indicator of physiological reserve in older adults, and also serve as a prognostic factor for risk of falls, frailty, institutionalization and mortality in geriatric patients[15].

Timed Up and Go Tests

The Timed Up and Go (TUG) test was used to assess dynamic balance, agility and functional mobility, according to Podisiadlo & Richardson[16]. Participants performed the TUG test using a standard chair (43 cm). The test zone was marked out using tapes on the floor, placed 3 meters apart. Participants were instructed to support their backs and arms on a chair in a seated position. The test started when they stood up and started walking on a flat surface for 3 meters, then turned around, walking back to the chair and sat down as fast as possible. The completion time was reported as the final score.

Loneliness Assessments

The loneliness outcome was measured using the University of California Los Angeles scale (UCLA, version 3). This version was validated in 1996 for its psychometric properties in a US adult cohort sample. It has become the most widely used scale to measure loneliness as it corresponds to various mental and physical health outcome aspects. Version 3 has been used extensively online. The coefficient α from validation studies ranged from 0.89 to 0.94 on this scale. The scale consisted of 20 positively and negatively worded questions (i.e., How often do you feel that there are people you can talk to?; How often do you feel that people are around you but not with you), with four response options for each question: "always," "sometimes," "rarely," or "never." Following author scoring rules, the positively worded items are reversed so that all 20 items are scored from 1 ("never") to 4 ("always"), for a total possible composite score ranging from 20 to 80 points, with higher scores indicating greater loneliness[17].

The home-based exercise program was self-administered and supervised synchronously (online). The exercises consisted of repeated sitting and rising from a chair (43 cm) (body mass based squat movement). Participants performed 3 sets of 8-12 repetitions (range 24-48 repetitions/session), with 3-5 minutes break between bouts, three times per week for 8 weeks. Each training session was 15-18 minutes long, including exercise and recovery. The sitting and rising from a chair exercise was selected because the movement executed is easy and straightforward to understand and follow.

This exercise program was also based on a study by Fujita et al.[18], where frail older adults engaged in a repeated sit-to-stand exercise. The authors showed that frail individuals were able to safely execute 48 complete repetitions with a short pause between bouts. The movement was performed at participants preferred cadence (~3 seconds) to avoid abrupt movement and potential spinal compression and back pain. None of the participants reported any type of pain during the intervention period. The frequency of 3 times per week was based on older adults guidelines for resistance training [19]. The program attendance cut-off criteria adopted was 85% participation. If participants did not meet these criteria, their data were excluded from the analysis.

Statistical Analysis

The experimental data were normally distributed (Shapiro–Wilk test, p>0.05) and, thus, data normality was assumed *a priori*. Student´s *t*-test was used to determine whether participant groups were matched for age, height, body mass, and body mass index (BMI). Two factors were considered for statistical testing: 1) Timepoint (pre, after 4 weeks [4W], or after 8 weeks [8W], as a paired condition); and 2) Group (control or HBEG, as an unpaired condition). The two-way ANOVA (with one-factor repetition) was selected to compare the following variables between timepoints and groups: CST (number of completed repetitions), GST (gait speed, in meters/second), TUG (time to complete the test, in seconds), and UCLA score (loneliness scale, points on scale). When statistically significant interactions were found, Tukey´s post-hoc test was applied to determine differences. For all statistical analyses, the level of significance (p-value) was set at 5% (P<0.05). Data were analyzed using SigmaPlot software version 14 (Systac Software, Inc., San Jose, CA, USA).

RESULTS

Pre-test Measurements

Participants' pre-test characteristics are presented in Table 1. As verified by Student´s t-test, participants were matched for age, height, body mass and BMI ($p>0.05$). The Two-Way ANOVA for repeated measures showed no statistically significant pre-test differences for CST, GST, TUG and PSL between the CG and HBEG groups ($p>0.05$).

Pre and Post-Test Measurements

Chair Standing Test (CST)

The number of repetitions during the CST differed statistically between the groups (CG vs. HBEG, $p=0.006$) and among timepoints (Pre $vs.$ 4W $vs.$ 8W, $p=0.043$). The interaction between the two factors (group vs. timepoint) was also statistically significant ($p=0.003$). The post-hoc test revealed that the number of repetitions on the CST was 37% higher (mean difference 3.6 repetitions) in the HBEG group than in the CG, a statistically significant difference ($p<0.005$, Figure 2A. Comparing the timepoints Pre, 4W, and 8W, the number of repetitions on the CST was statistically higher after 8W than at Pre-training ($p=0.039$) In the CG, this difference was not statistically different ($p>0.05$), whereas in the HBEG the number of repetitions was statistically ($p<0.001$) higher after 8W than at Pre-training. Comparing groups for timepoints 4W and 8W, the number of repetitions in the HBEG was statistically higher than in the CG ($p<005$).

Gait Speed Test (GST)

As illustrated in Figure 2B, no statistical differences in gait speed on the GST were found between groups (CG $vs.$ HBEG group, $p=0.323$) or among timepoints (Pre $vs.$ 4W $vs.$ 8W, P=0.068). However, the p-value of the main effect among timepoints was 0.068. As depicted in Figure 2B, gait speed in the HBEG decreased after 8W of training, although this decline was not statistically supported at a p-level of 5%.

Timed Up and Go Test (TUG)

The time taken to complete the TUG test showed no statistically significant difference between the groups (CG $vs.$ HBEG group, $p=0.551$) or among timepoints (Pre $vs.$ 4W $vs.$ 8W, $p=0.627$), as depicted in Figure 2C. The interaction between the two factors (group and timepoint), however, differed statistically ($p=0.021$). In the CG, performance at pre-training was statistically lower compared to the 8W timepoint ($p<0.05$), indicating longer time to complete the TUG at week 8. In the HEBEG group, this same comparison revealed no statistical difference between timepoints($p>0.05$).

Perceived Loneliness

As depicted in Figure 2D, scores on the loneliness scale did not differ statistically between the groups (CG $vs.$ HBEG groups) or among timepoints (Pre $vs.$ 4W $vs.$ 8W) ($p>0.05$).

Table 1. Pre-test characteristics for age, height, body mass, and body mass index in control group (CG) and home-based exercise program (HBEG) group. São Paulo, Brazil, 2021.

Variables	CG	HBEG
Age (years)	70.5 ± 8.1	67.9 ± 7.7
Height (cm)	158.1 ± 7.6	159.4 ± 10.4
Body mass (kg)	70.6 ± 13.5	73.5 ± 16.5
BMI (kg/m²)	28.2 ± 4.9	29.0 ± 6.1

#Statistical difference versus CG, *statistical difference versus 4W and §statistical difference versus Pre-training.
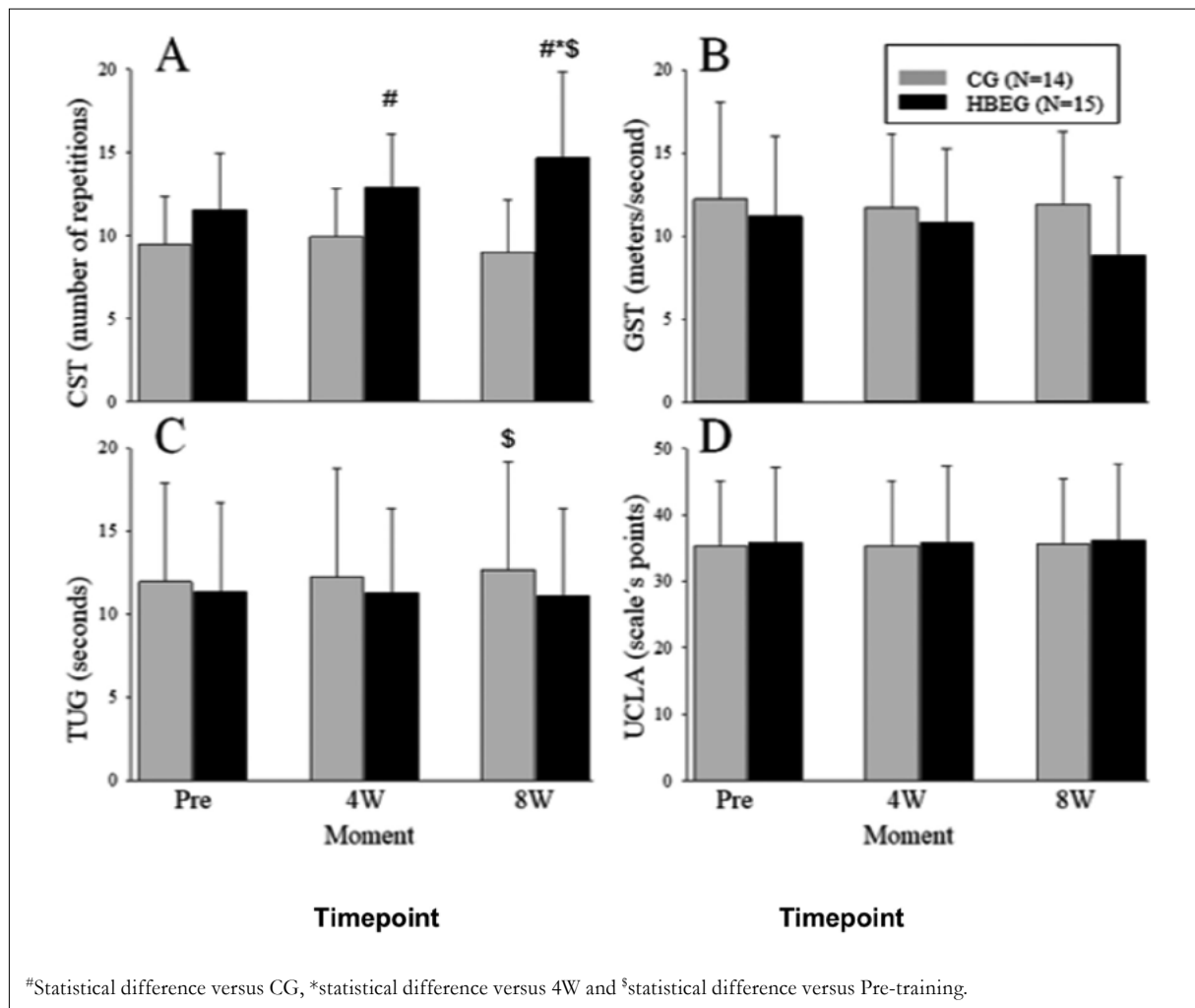
Figure 2. Comparison of outcomes on Chair Stand Test (CST, in A), Gait Speed Test (GST, in B), Timed Up and Go test (TUG, in C) and on loneliness assessment scale (UCLA, in D) between the control group (CG) and home-based exercise program (HBEG) group at timepoints pre, 4 weeks and 8 weeks (Pre, 4W and 8W, respectively). São Paulo, Brazil, 2021.

DISCUSSION

The primary aim of the study was to determine the effect of home-based physical training on functional capacity and perceived loneliness in older people experiencing lockdown. The main results showed that a simple, easy-to-perform, low-cost, equipment-free, short-duration physical training program consisting of squat exercises against one's own body weight (TUG and CST) improved muscular endurance and lower limb strength, gait speed, as well as maintained dynamic balance, agility, and functional capacity in older people experiencing lockdown. Thus, the self-directed intervention had a protective effect against physical inactivity exacerbated by lockdown restrictions. However, there was no impact on perceived loneliness post-intervention in either of the groups. In addition, a reduction in dynamic balance, agility, and functional capacity was observed in the sedentary group after 8 weeks.

The results obtained from the 30-second CST showed that the HBEG performed a higher number of repetitions than the CG (63% higher, or additional ~6 repetitions) (Figure 2A). These results are consistent with the findings of the study conducted by Fujita et al.[18,20]. These authors performed 12 weeks of physical training in institutionalized

older people based on squatting against own body weight. The exercise consisted of sitting and standing up repeatedly from a chair. A 19.4% increase in isometric knee extension torque was found at week 4 (pre: 1.07±0.28 Nm/kg vs. 1.26±0.26 Nm/kg) and 23.9% (1.31±0.28 Nm/Kg) at week 12. The results obtained by the authors are important because aging is associated with reductions in muscle function and structure. These declines lead to sarcopenia, directly affecting functional capacity, activities of daily living and an independent lifestyle[21,22]. Furthermore, these changes may have a greater impact if the older person reduces their level of physical activity, as seen in lockdown[23]. During the pandemic, physical training programs in the home environment seem extremely promising for improving or maintaining individual fitness and health, as demonstrated by the results of the present study.

Regarding GST, the study data showed that the intervention increased walking speed after 8 weeks of physical training. The HBEG was, on average, 55% faster (0.65 m.s-1) than the CG (0.42 m.s-1), with a gain of 0.23 m.s-1 post-intervention (Figure 2B), although this was not statistically supported at a p-level of 5%. The gait speed gain observed in the current study is higher than that reported by Hortobagyi et al.[24], who showed gains of 0.10 m.s-1 even in healthy older people. The researchers also showed that different types of exercise intervention, such as resistance training (0.11 m.s-1), coordination (0.09 m.s-1), and multimodal (0.09 m.s-1), resulted in similar improvements in gait speed.

According to Hardy et al.[25], and Studenski et al.[26], higher walking speed is associated with increased survival rate in older adults. Conversely, a gait speed of less than 1.0 m.s-1 predisposes individuals to greater health risks and represents a strong predictor of adverse health-related events in older adults, such as increased risk of falls, fragility, disability, hospitalization, morbidity and mortality[27-29]. Confirming these findings, Atkinson et al.[30] Muehlbauer et al.[31] and Stahnke et al.[32], also identified a negative association of walking speed with back or leg pain, poor vision, low levels of physical activity, low aerobic capacity, cognitive impairment, and depression. Therefore, exercise interventions play an important role in improving

walking speed of older adults. Thus, the present study showed that gait speed can be increased even after a remote home-based physical training program targeting the lower limbs.

As reported in the results section, the time to complete the TUG test showed no interaction between the two factors (group and timepoint). The CG took longer to complete the test at post-assessment compared to pre-assessment, indicating loss of dynamic balance and agility over 8 weeks. However, the HBEG showed no statistically significant differences between pre and 8 weeks, indicating maintenance of dynamic balance and agility throughout the study. The application of the TUG test requires the subject to make rapid changes in direction and shifts in center of mass. Thus, performing the test involves several physical abilities, such as dynamic balance, agility, muscle strength, speed and power. Although the training program implemented in the study focused predominantly on muscle strength, the maintenance of these abilities in the HBPG, relative to the declines seen in the CG, is considered a positive outcome. The results of this study are similar to those reported by Vieira et al.[33], showing that TUG results remained unchanged between a control group and a group of older women who performed Pilates for 12 weeks.

Although no statistically significant differences were detected according to mean times, comparison of individual standardized changes showed that TUG performance of the HBEG versus the CG at pre and 8 weeks differed (Figure 3C), indicating a negative effect of lockdown (with longer TUG completion times at week 8). Sakugawa et al.[34] conducted a study in which older adults completed 12 weeks of training, 16 weeks of de-training, and 8 weeks of retraining. TUG test performance was faster at post than pre-training periods. In the current study, the training program also involved muscular strength, but the exercise intensity was lower than in Sakugawa's study, a factor which may account for these differences. Martinez et al.[35] suggested a TUG completion time of ≥10.85 seconds as a cut-off point for predicting sarcopenia. Although both groups in the current study had times exceeding 10.85 s, completion times for the CG increased over time (pre-training: 12.0±5.9; 4 weeks: 12.3±6.5 and 8 weeks: 12.7±6.5),

i.e. an average of almost 2 seconds higher than the cutoff point, which may predispose these individuals to greater health risks such as sarcopenia. On the other hand, the HBEG had TUG times (pre-training: 11.4±5.3, 4 weeks: 11.3±5.1 and 8 weeks: 11.1±5.3) closer to the 10.85 seconds cutoff recommended by Martinez et al.[35] Thus, a home-based physical training program proved sufficient to maintain performance on the TUG test, avoiding additional losses in the physical abilities involved in the test.

Regarding scores on the perceived loneliness test, there were no statistically significant intra or intergroup differences, or for individual standardized changes between HBEG and CG at pre and 8 weeks. This result is consistent with a recent meta-analysis conducted by Shvedko et al.[11] examining the effects of physical activity on loneliness in socially isolated and socially supported older adults in the community. Positive effects of physical activity on social interactions were demonstrated, i.e., physical activity improved social relationships between participants based on mutual needs and interests. However, physical activity was not effective in reducing perceived social isolation and loneliness. Similarly, the home-based physical training program conducted in the current study proved unable to change perceived loneliness, probably because the program was conducted individually and failed to promote sufficient social interaction. In addition, the present study had some limitations that should be considered. Although statistical differences in functional ability were found, data collection and testing applications can lead to potential measurement bias. Nevertheless, scientific evidence demonstrates the benefits of supervised remote home-based exercise programs on the functional capacity of older adults.

CONCLUSION

The physical training program implemented proved feasible with excellent adherence and can serve as a basis for mitigating the impact of aging and lockdown on muscle function and functional ability. As demonstrated in the present study, individuals involved in the program improved muscle strength, gait speed, and maintained dynamic balance and agility. Physical training programs play an important role in reducing falls, sarcopenia, frailty, disability, hospitalization and chronic diseases. Thus, the older adults in lockdown, despite the pandemic, were able to engage in simple, regular exercise routines in order to improve and/or maintain their physical health.

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Exposure to insufficient levels of physical exercises among older adults during physical distancing as a result of covid-19

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Abstract

Objective: To determine the prevalence of exposure to insufficient levels of physical exercise among older adults during the period of physical distancing because of covid-19 and analyse associated factors in the Federal District, Brazil. *Method:* This is an epidemiologic survey with cross-sectional design and sample representative of a Brazilian state (n=745 older adults). Data were collected through a computer-based questionnaire. The outcome variable was practice of physical exercises during physical distancing (≥2/week and ≥30 minutes). To analyse data, associative procedures (binary logistic regression) were used. *Results:* The prevalence of exposure to insufficient levels of physical exercise was 42.8%, which was associated to lack of physical activity prior to physical distancing ($p<0,001$), lack of online physical activity lessons ($p<0,001$) and exposure to sedentary behaviour during physical distancing ($p=0,005$). *Conclusion:* Physical distancing has resulted in high prevalence of exposure to insufficient levels of physical exercise among older people, which can have deleterious health effects. Measures are needed to guide this population on strategies to maintain active habits during similar periods.

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INTRODUCTION

The new coronavirus (covid-19) was firstly reported in December 2019 in China (Wuhan), and, within only three months, the disease became a worldwide pandemic, with more than 353,000 confirmed cases and 15,000 deaths[1]. The evolution of the pandemic can be followed through several official websites, such as the interactive web-based panel to trace covid-19 in real time, developed by the Centre for Systems Science and Engineering at Johns Hopkins University (https://www.eficiens.com/coronavirus-statistics/). On September 5th, 2022, 604,636,131 cases had been registered, as well as 6,496,157 deaths.

Most epidemiology specialists agree that success in combating the virus in China and in other countries is due to quick measures taken by authorities to enforce physical distancing to the majority of the population[2]. After nineteen months of pandemic, Brazil had 21,644,464 covid-19 infection cases and 603,282 deaths[3]. Data reveal that this unprecedented health crisis has affected the entire population, especially those at higher risk, such as older adults and people with pre-existing conditions[4].

Although physical distancing is recommended to interrupt the rapid spread of the new coronavirus until mass vaccination is reached, this can result in negative impacts on other health dimensions of older people, such as changes in lifestyle, especially regarding low levels of physical activity[5].

However, it is consensus in the scientific literature that, to maintain adequate health status, to neutralize the negative consequences of certain diseases (diabetes, hypertension, cardiovascular, and respiratory diseases) and to ensure healthy aging, thus reducing risks of frailty, sarcopenia and dementia, older adults must engage in physical activities[6]. The American College of Sports Medicine (2020) recommends that, to maintain physical health during the period of physical distancing, older adults should accumulate 150-300 weekly minutes of moderate-intensity aerobic physical activity, and 2 weekly sessions of muscle training performed at home through technology, music, and mobile applications[7]. In addition, it is necessary to limit sedentary behaviour (sitting time), and although there is no consensus in literature on the cut-off point for older adults, there is evidence that exposure should not exceed 4 hours daily[8].

Although there are some physical (inadequate facilities) and psychological barriers (fear, laziness, tiredness) to the practice of regular and intentional physical activity such as physical exercises and sports among older adults in a situation of physical distancing, there are many possibilities to do exercises at home[9]. In this sense, online classes, supervised by professionals, have become especially essential for this population during physical distancing to maintain physiological function and especially mental health, reducing risk factors for anxiety and depression[10].

However, despite the knowledge about the numerous benefits of physical activity and physical exercise, a high prevalence of insufficient levels worldwide with increasing trend is observed, as demonstrated in the study that included data from almost 2 million participants (96 % of the global population) in 2016, which revealed that more than a quarter of all adults were insufficiently active, with prevalence being twice as high in high-income countries (36.8%, 35.0–38.0) compared to low-income countries (16.2%, 14.2–17.9) and increasing over time in high-income countries (31.6%, 27.1–37.2, in 2001)[11].

In addition, there is evidence that physical distancing resulting from Covid-19 has resulted in significant decrease in levels of physical activity and increase in sedentary behaviour among older people worldwide, with harmful consequences for the physical and mental health of these individuals[12-14]. Physical inactivity, even in the short term (1-4 weeks) can cause rapid deterioration of the cardiovascular health and death in population with increased cardiovascular risk[15]. A nationwide cross-sectional survey (n=43,995 Brazilian adults) revealed that increases in physical inactivity and screen time during the Covid-19 pandemic were associated with worse mental health indicators, with individuals with depression and physical inactivity being the most likely groups to experience loneliness and sadness[14].

Therefore, considering the practice of physical exercise at recommended levels as a challenge for health public policies to prevent diseases and their complications, and observing the importance of monitoring this behaviour among older adults in physical distancing during the covid-19 pandemic, the aim of this study was to determine the prevalence of exposure to insufficient levels of physical exercise during physical distancing and analyse associated factors.

METHODS

This research is characterized as an epidemiologic survey, with cross-sectional design and sample representative of a Brazilian state about the practice of physical exercise by older adults during the period of physical distancing resulting from covid-19.

The study was conducted in the Federal District, located in the Mid-Western region of Brazil, with total area of 5,779,999 square kilometers[16], and total population of 2,974,703, of which 447,957 are older adults[17]. Older adults are considered individuals aged 60 years or older, as established in the first paragraph of Law 10.741/2003, the "Estatuto do Idoso".

To carry out the research sample planning, the population survey sampling process or descriptive study was used, with random sampling (non-cluster) through the Statcalc application of the Epi Info software version 7.2.2.6, considering: total population of older adults in the Federal District, with frequency of 50% as expected value, confidence level of 95%, tolerable error in sample of 1.5 percentage point and 80% power. The required sample size was n=350 individuals. To avoid losing sample representativeness, sample size was increased by 20% for several reasons, such as: participant refusal, lower age than that established for this study and failure to respond to important questions in the questionnaire. The final minimum sample included 420 older adults.

Their participation in the project was voluntary, and the following criteria were used for insertion in the study: people aged 60 or older of both sexes, who agreed to participate by signing the Consent Form and adequately answered the online questionnaire. On the other hand, questionnaires filled out by individuals who did not live in the Federal District, Brazil, were excluded from the study, as well as duplicates.

Aiming to answer the research question, a questionnaire was developed and sent to participants from the Federal District, Brazil, in the period between September 2020 and April 2021. The electronic questionnaire was sent through email and WhatsApp with link access generated using Google's free tool, Google Forms. The questionnaire was available at the following URL: https://forms.gle/SszeurxAAAZQBfVTA.

Data collection was mainly chosen due to the physical distancing practices required during the covid-19 pandemic. Moreover, as the number of internet users increases every year across all ages, especially in the elderly, email has become a favourable method for collecting data for scientific research in the Health Sciences because it represents a cost-effective possibility that is also faster, more practical, and more convenient for the participants of the study, which may positively impact the number of answers obtained[18].

The outcome variable was the practice of physical exercise during physical distancing because of the covid-19 pandemic, measured through the question, "During physical distancing, have you practised physical exercises regularly, repetitively, and intentionally (physical exercise or sport), twice a week or more, for at least 30 minutes? (yes/no)."

This study analysed demographic variables such as age (60-69 years / 70-79 years / ≥80 years), sex (male / female), socioeconomic variables such as education (did not attend school / incomplete Elementary School / complete Elementary School / High School / Higher Education), place of residence by Human Development Index (high HDI / very high HDI / No data), type of residence (apartment / house), how many people in the household (lives alone / lives with other people), including variables about risk behaviours prior and during the covid-19 pandemic, such as negative health self-perception, exposure to sedentary behaviour, and insufficient level of physical exercise.

Chart 1 shows the independent variables on risk behaviours related to the respective and objective question in the questionnaire, added by the categorisation applied to the model.

Descriptive analysis was performed through the calculation of prevalence and 95% confidence intervals (95%IC) for the variables of interest in this study. For the multivariable analysis, binary logistic regression was used, presenting the odds ratio as a measure of association. Variables with $p<0.20$ in the gross multivariable analysis were maintained for adjustment by sex, age, and education. Variables whose p value was below 0.05 were considered significantly associated to the outcome.

This project was approved by the Ethics Committee in Research with Human Beings at the Faculty of Health Sciences, University of Brasilia (CEP/FS-UnB), under CAAE protocol number 33798220.3.0000.0030.

RESULTS

Data from 780 older adults were analysed, and 35 were excluded because they did not live in the Federal District, Brazil. The final sample was composed of 745 individuals (74.9% women, 25.1% men), aged 60 years or older and with the most frequent age ranging from 60 to 69 years old (60.9%).

Table 1 presents the demographic and socioeconomic characteristics of participants. The sample showed higher proportion of individuals with higher education (72.1%), who live in areas of very high HDI (83.0%), who live in apartments (50.2%) and those who live with other people (74.9%).

Chart 1. Independent variables on risk behaviours in relation to health, as analysed in the study.

Independent variable	Objective question	Category
Practice of physical exercises before PD	During physical distancing, have you practised physical exercises regularly, repetitively, and intentionally (physical exercise or sport), supervised by a professional, twice a week or more, for at least 30 minutes?	No (0) Yes (1)
Online practise of physical exercises during PD	During PD, have you practised physical exercises through online classes?	No (0) Yes (1)
Health self-perception before PD	In general, how would you rate your health?	Negative (0) = regular / poor / very poor Positive (1) = good / very good
Health self-perception during PD	When comparing your health today with that before PD, you would say that your health today is:	Negative (0) = worse Positive (1) = equal / better
Exposure to sedentary behaviour before PD	How long, in total, did you spend sitting during a normal weekday before PD?	Exposed (0) = ≥ 4 hours daily Not exposed (1) = < 4 hours daily
Exposure to sedentary behaviour during PD	During PD, what would you say about the time you spend sitting during a normal weekday in comparison to the period before distancing?	Exposed (0) = increased Not exposed (1) = stable / lower

PD= Physical Distancing.

Table 1. Demographic and socioeconomic characteristics of participants, Federal District, Brazil, 2020-2021 (n=745).

Variables	Categories	n	%(95%CI)
Sex	Female	558	74.9 (71.8 – 78.0)
	Male	187	25.1 (22.0 – 28.2)
Age	60-69	454	60.9 (57.4 – 64.4)
	70-79	244	32.8 (29.4 – 36.2)
	≥ 80	47	6.3 (4.6 – 8.0)
Education	Did not attend school	02	0.3 (0.2 – 0.4)
	Incomplete ES	65	8.7 (6.7 – 10.7)
	Complete ES	120	16.1 (13.5 – 18.7)
	Complete HS	21	2.8 (1.6 – 4.0)
	Higher Education	537	72.1 (68.9 – 75.3)
Place of residence	High HDI	71	9.5 (7.4 – 11.6)
	Very high HDI	618	83.0 (80.3 – 85.7)
	No data	56	7.5 (5.6 – 9.4)
Type of residence	Apartment	374	50.2 (46.6 – 53.8)
	House	371	49.8 (46.2 – 53.4)
Lives alone	Yes	187	25.1 (22.0 – 28.2)
	No	558	74.9 (71.8 – 78.0)

ES=Elementary School; HS=High School; HDI=Human Development Index.

Higher proportion of participants who practised physical exercise before (77.7%; 95%CI 74.7-80.7) and during (57.2%; 95%CI 53.6-60.8) physical distancing (PD) was verified. However, it was possible to observe that there was a reduction of approximately 20% among individuals who practised it before in relation to those who kept exercising during PD. Likewise, the prevalence of health self-perception classified as "good" was observed in 51.0% (IC95% 47.4-54.6); "equal" health self-perception during PD, when compared to the previous period, was observed in 72.1% (IC95% 68.9-75.3). Higher proportion of individuals who did not practise physical exercises by following online classes during PD was also evidenced (63.1%; 95%CI 59.6-66.6), compared with individuals who were exposed to sedentary behaviour prior to PD (63.0%; 95%CI 59.5-66.5), and those who reported increase in exposure to sedentary behaviour during PD (56.1%; 95%CI 52.5-59.7). Results are shown in Table 2.

In the model obtained through gross logistic regression, variables for health risk behaviours associated with the outcome were: practice of physical exercise before PD (No), practice of physical exercise through online classes (No), sedentary behaviour during PD (Exposed). On the other hand, exposure to sedentary behaviour prior to physical distancing was not associated to the outcome, and health self-perception before and during PD (Negative) was a protective factor (Table 3).

In the final model obtained through adjusted logistic regression, individuals who did not practise physical exercise before PD and those who did not practise exercises through online classes were, respectively, 4 to 6 times more likely to not exercising during PD when compared to their peers (OR=4.10; 95%CI 2.78-6.04) and (OR=6.22; 95%CI 4.30-9.00). Likewise, those exposed to sedentary behaviour during PD were 16% more likely to not practising physical exercise during PD. On the other hand, negative health self-perception both before and during PD was a protective factor for exposure to insufficient levels of physical exercise, when compared to their peers (Table 3).

Table 2. Prevalence of health risk behaviours for individuals in physical distancing due to the covid-19 pandemic, Federal District, Brazil, 2020-2021.

Variable	Category	n	% (95%CI)
Physical exercise before PD	Yes	579	77.7 (74.7-80.7)
	No	166	22.3 (19.3-25.3)
Physical exercise during PD	Yes	426	57.2 (53.6-60.8)
	No	319	42.8 (39.2-46.4)
Physical exercise through online classes during PD	Yes	275	36.9 (33.4-40.4)
	No	470	63.1 (59.6-66.6)
Health self-perception	Very good	232	31.1 (27.8-34.4)
	Good	380	51.0 (47.4-54.6)
	Regular	118	15.8 (13.2-18.4)
	Poor/Very poor	15	2.0 (1.0-3.0)
Health self-perception during PD	Better	57	7.7 (6.0-9.6)
	Equal	537	72.1 (68.9-75.3)
	Worse	151	20.3 (17.4-23.2)
Sedentary behaviour before PD	< 4 hours/day	469	63.0 (59.5-66.5)
	≥ 4 hours/day	276	37.0 (33.5-40.5)
Sedentary behaviour during PD	Reduced	82	11.0 (8.8-13.2)
	Stable	245	32.9 (29.5-36.3)
	Increased	418	56.1 (52.5-59.7)

PD= Physical Distancing; CI=Confidence interval.

Table 3. Crude and adjusted multivariable analysis of health risk behaviours associated with exposure to insufficient levels of physical exercise among participants during physical distancing due to the covid-19 pandemic, Federal District, Brazil, 2020-2021.

Variables/ Categories	Crude OR (95% CI)	p	Adjusted OR[b] (95% CI)	p
Practice of physical exercise before PD				
Yes	1	0.000	1	0.000
No	4.00 (2.76-5.79)		4.10 (2.78-6.04)	
Practice of physical exercise through online classes during PD				
Yes	1	0.000	1	0.000
No	5.64 (3.97-8.03)		6.22 (4.30-9.00)	
Health self-perception before PD				
Positive	1	0.000	1	0.000
Negative	0.36 (0.25-0.54)		0.41 (0.27-0.62)	
Health self-perception during PD				
Positive	1	0.000	1	0.000
Negative	0.25 (0.17-0.36)		0.25 (0.17-0.37)	
Sedentary behaviour before PD[a]				
Not exposed	1	0.344	-	-
Exposed	0.86 (0.64-1.17)		-	-
Sedentary behaviour during PD				
Not exposed	1	0.005	1	0.005
Exposed	1.64 (1.22-2.21)		1.55 (1.14-2.10)	

[a]$p>0.20$ in crude analysis; [b]Adjusted by age, sex, and education; PD= Physical Distancing; CI= Confidence interval; OR=Odds Ratio.

DISCUSSION

The main findings of this study were: 1) increase in prevalence of exposure to insufficient levels of physical exercise during physical distancing in comparison to the previous period; 2) exposure to insufficient levels of physical exercise was associated to the lack of exercise before physical distancing, lack of exercise through online classes during physical distancing, and exposure to sedentary behaviours during physical distancing; 3) negative health self-perception prior to and during physical distancing was a protective factor for exposure to insufficient levels of physical exercise during physical distancing.

It was observed that exposure to insufficient levels of physical exercise among participants increased during physical distancing, and the results are similar to those obtained in studies conducted in Brazil and in other countries[12,19-22]. A cross-sectional study carried out in Brazil with data from the virtual health enquiry showed that, before covid-19, 30.4% (95%CI 27.2-33.8) of older adults practised exercises at sufficient level and, during the pandemic, values dropped to 14.2% (95%CI 11.9-16.9)[19].

Likewise, a study carried out in Japan showed that, in only three months of pandemic, the total time of physical activity dropped significantly among older adults in the community[20]. An electronic investigation carried out by thirty-five research organisations in Europe, Northern Africa, Western Asia, and the Americas demonstrated that home confinement during covid-19 brought negative effects across all levels of physical activity intensity (vigorous, moderate, walking, and in general), for both adults and older adults[12].

This study also observed that older adults who did not exercise before physical distancing were more likely to not do exercises during it. This result corroborates an online survey carried out in Canada, in which 40.5% of adults and older adults were inactive, and 22.4% of those who were active became less physically engaged. Moreover, 33% of inactive individuals and 40.3% of active ones became more physically active[23].

Even though evidence on the relationship between physical exercise and viral respiratory infections is scarce, especially regarding a highly contagious virus such as SARS-CoV-2[24], studies have shown that not adhering to the recommended levels of physical exercise can negatively impact the health in older adults during a pandemic[25,26] because, among the several benefits of regular practice of physical exercise during the aging process, control and protection against cardiovascular diseases and mortality, cancer, fractures, recurring falls, functional incapacity, cognitive decline, and depression can be highlighted[13,27].

Another behaviour that seems to be associated to the outcome was the exposure to sedentary behaviours. Despite being different and independent constructs, this study observed that exposure to sedentary behaviour increased the likelihood of older adults not practising physical exercises during physical distancing. This result suggests that not practising exercises during the isolation period can lead to other risky behaviours, such as prolonged sitting periods using screens such as smartphones, computers, or TV[12,19,28].

Moreover, a study carried out in China showed that, during the national lockdown, more than half of all Chinese adults temporarily adopted a sedentary lifestyle, with insufficient physical activity, more screen time, and lowered emotional state; on the other hand, individuals who engaged in vigorous physical activity (physical exercise or sports) presented improved emotional state and shorter screen time compared to those with light physical activity[21].

The reduction in levels of general physical activity and the increase in exposure to sedentary behaviour during physical distancing may represent health risks for older adults in several dimensions, especially decline of functional capacity due to a period of skeletal muscle disuse and reduction in neuromuscular skills. Therefore, practising physical exercises at home became a strategy to mitigate physical inactivity and improve or maintain muscle function and functional performance during physical distancing due to the covid-19 pandemic[28].

This investigation also revealed that older adults who did not practise physical exercises through online classes were more likely to be exposed to insufficient levels of physical exercise during physical distancing. Likewise, study carried out in France showed that the covid-19 pandemic affected the number of individuals who attended programs of group physical activities, and that older adults expressed their need of remaining physically active by practising home exercises[22].

Therefore, among barriers for the practice of physical exercises during physical distancing, environmental factors stand out, because places destined to the practice of exercises, either in open environments such as parks and squares, or indoor spaces, such as gym complexes, were prevented from operating by health authorities as a measure for containing SARS-CoV-2. Despite being widely recommended, physical activity through online classes and through videos, websites, and applications[25] are not accessible to the general population, especially those with low socioeconomic status[29].

In this study, it was also observed that negative health self-perception, before and during physical distancing, was linked to the outcome, but as a protective factor. This shows that older adults who perceive their health as "regular," "poor," or "very poor" were less likely to be exposed to low levels of physical exercise during physical distancing. This result diverges from other studies, which suggested a relationship between practice of physical exercise and higher prevalence of positive health self-perception, or between less practice of physical activity and negative health self-perception[30,31].

A possible explanation for this result is the socioeconomic profile of participants, with high education level and income. Studies have shown association between low education and income with negative health self-perception[31-33]. Moreover, low prevalence of negative health self-perception (17.8%)

was observed with only 2% of perceptions classified as "poor" and "very poor."

The present study has some limitations that should be highlighted, among them the use of cross-sectional design, which does not allow inferring cause and effect relationships involving independent variables with the outcome; data collection through the internet may not reach lower-income individuals, since not everyone has access to this means of communication and/or has difficulties with technology, making data generalization for all older adults living in the Federal District impossible; and the difficulty in helping participants when they did not understand a given question. However, this limitation was minimized by the considerable increase in the sample size and care in sample selection and dimensioning

CONCLUSION

It could be concluded that physical distancing resulted in significant changes in the lifestyle of the elderly population, especially with regard to exposure to low levels of physical exercises, which can result in deleterious health effects in the near future. Therefore, not interrupting or even starting a physical exercise program during the period of physical distancing and adopting other healthy behaviours is particularly important to maintain or improve the health of these individuals, as they are considered a risk group for many diseases, including Covid-19.

In this sense, measures are needed to guide the elderly population on strategies to maintain active habits during the period of physical distancing. Public policies aimed at promoting physical exercises for older adults in similar situations are suggested, such as online training, considering accessibility for low-socioeconomic individuals and/or with limitations in the use of technologies.

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Original Articles

1 of 10

Incidence of frailty and factors associated with functional deterioration in oldest old during the covid-19 pandemic: A cohort study

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Abstract

Objective: To assess the incidence of frailty in oldest old during the covid-19 pandemic and to evaluate the associations between the domains of the Clinical-Functional Vulnerability Index (IVCF -20) and frailty. *Methods:* A cohort study of 64 non-frail oldest old was conducted. Participants were evaluated at two timepoints: at baseline up to one year before the onset of the pandemic; and at follow-up, with an average interval between the two timepoints of 15 months. Frailty was assessed using the VS – Frailty (baseline) and remote application of the IVCF-20 (follow-up). *Results:* Mean participant age was 88.7±5 years and the incidence of frailty was 20.6%. Frail participants exhibited greater dependence shopping (p<0.001), controlling their own money (p<0.001) and doing housework (p=0.010), as well as bathing alone (p=0.041). Cognitive decline was more prevalent in the frail individuals. The presence of despondency sadness or hopelessness proved high (92.3%) and was associated with frailty (p<0.001). On the multivariate analysis, frailty was associated with worsening forgetfulness (RR=2.39; 95%CI 1.27-4.46), loss of interest and pleasure in performing activities (RR=4.94; 95%CI 1.98-12.35) and fecal/urinary incontinence (RR=2.40; 95%CI 2.91-1.53). *Conclusions:* The incidence of frailty among the oldest old during the pandemic was high. Results showed that multiple domains were affected, reinforcing the need for broad evaluation of older individuals as a whole, especially in atypical periods such as the pandemic.

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INTRODUCTION

The oldest old, individuals aged ≥80 years, is the fasting growing age group worldwide and, in Brazil, represents around 15% of the older population[1]. While most projections consider age only, the population does not age homogenously, where older individuals have different degrees of vitality or frailty[2].

Level of vitality depends on homeostatic reserve and the body´s ability to cope with negative health events[2]. In this respect, age is a risk factor for loss of vitality and frailty, but not a determinant of this outcome[2]. Healthy aging can be defined as preservation of global functioning of older adults, supported by autonomy (cognition, mood and behavior) and independence (mobility and communication)[3] which enable well-being in aging[4].

Thus, the dynamic of aging is complex, involving a balance of the individual´s intrinsic capacity, the environment, and interaction between these two, shaped by resiliience[4]. Adverse situations, such as the emergence of the novel coronavirus[5], can disrupt this dynamic.

The covid-19 pandemic was officially declared in March 2020, with ensuing recommendations for social distancing and lockdowns[6]. Although the same environment can affect older adults differently and in highly disparate ways[6], social distancing and lockdown measures can have secondary impacts on the health of the population. These affects include psychological factors with worsening of anxiety and depressive symptoms associated with social disconnection, in addition to life-style changes, such as reduced level of physical activity, which can influence physical health and have a negative impact on functioning[8]. All of these changes can contribute to the development of frailty[9,10] on a broader level, particularly in the oldest old who are at higher risk of becoming frail. However, to date, most related studies have been conducted in developed countries and fail to stratify older adults into sub-age groups.

The primary measure of the multidimensional aspect of health of older adults is the Comprehensive Geriatric Assessment (CGA), a tool for identifying and managing frail older people[11]. However, the instrument takes a long time to apply and must be administered by specialized teams [12]. Moraes et al.[12] devised the shorter Clinical-Functional Vulnerability Index-20 (IVCF-20), an instrument for detecting clinical-functional vulnerability[12]. This screening is carried out by means of a questionnaire scale which uses the CGA as a reference standard. The index, similarly to the CGA, is designed to collect information on the indicators age, self-rated health, activities of daily living, cognition, mood, mobility, communication and multiple comorbidities[12].

Therefore, based on the hypothesis that lockdown and social distancing can contribute to the development of frailty in non-frail older adults, the objective of the present study was to assess the incidence of frailty during the covid-19 pandemic and evaluate the associations between the domains of the IVCF-20 and the development of frailty.

METHOD

A cohort study of oldest old treated at the Healthy Aging Clinic of the Jenny de Andrade Faria Institute of the Clinical Hospital from the Federal University of Minas Gerais, Brazil, was conducted. The clinic is part of the Referral Center for Older Adults. The study involved two assessment timepoints: baseline – between March 2019-2020; and follow-up – between November 2020 and October 2021, with an average interval between timepoints of 15 months.

The inclusion criteria were: older adults of both genders, aged ≥80 years, and non-frail 12 months before the onset of the pandemic, defined as March 2020 according to the WHO declaration[6]. Centenarians were included irrespective of their functional status, being considered examples of healthy aging[13]. Older adults who did not possess a telephone to allow remote contact and data collection were excluded from the study.

Frailty at baseline was classified according to the multidimensional frailty model of Moraes et al.[14] under which Clinical-Functional Classification is categorized on the Visual-Analogue Scale of Frailty (VS–Frailty). With this model, older people are classified into categories (1-10) based on the progressive reduction in vitality associated with increase in frailty[14]. Non-frail older individuals

are classified into the 1-5 category. The use of this method is consistent with the WHO International Classification of Functioning with an emphasis on functioning[14].

During follow-up, given the social distancing and lockdown down measures in place and discontinuation of elective visits at the clinic, frailty was assessed by applying the IVCF–20 (https://www.ivcf20.org) remotely. This instrument was chosen for its ease of application in remote form. The questionnaire was applied over the telephone by previously trained researchers.

Of the total eligible patients (134), 68 could not be contacted: 13 because they did not possess a telephone and 55 because the number registered was not the patient´s or the call did not go through. There were no cases of death due to infection by covid-19. The final sample is depicted in Figure 1:
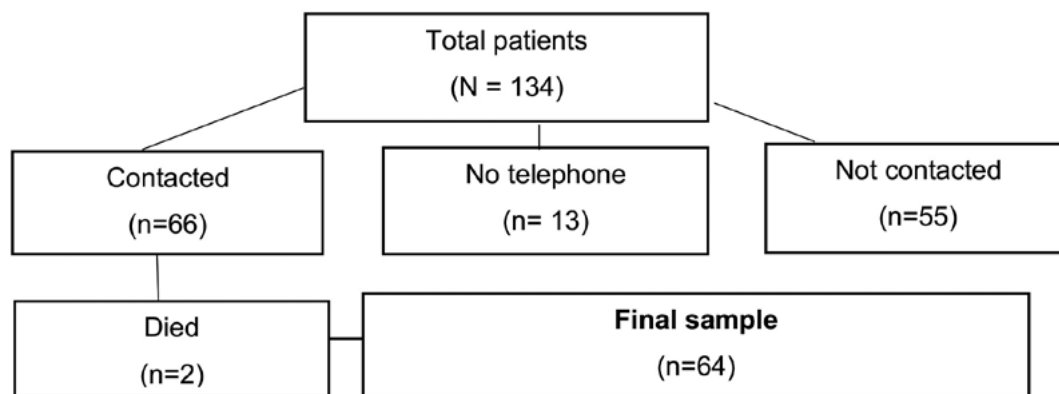
Figure 1. Sample selection based on total number of patients enrolled at Healthy Aging Clinic, 1 year prior to covid-19 pandemic.

The IVCF–20 comprises 20 items divided into 8 domains, namely: age (1 item); self-rated health (1 item); functional disabilities, subdivided into basic and instrumental activities of daily living (4 items); cognition (3 items); mood (2 items); mobility, subdivided into reach, grasp, and pincer grip, aerobic capacity and/or muscle strength including unintentional weight loss, body mass index (BMI), calf circumference and gait speed, and fecal/urinary incontinence (6 items); communication, which includes vision and hearing (2 items); and multiple comorbidities, including polypathologies, polypharmacy and recent hospitalization (1 item).

Owing to the fact the questionnaire was applied over the telephone, the mobility domain did not include the calculation of BMI, measurement of calf circumference or timings of gait speed, as per adaptations for remote application[15]. Each domain has specific scoring with maximum of 40 points. A total score in the 0-6 points range indicates the respondent has low clinical-functional vulnerability and is likely robust. A score of 7-14 points suggests the respondent is at risk of becoming frail (pre-frail), while a score of ≥15 points suggests the individual is frail (high clinical-functional vulnerability)[12]. Robust older adults are individuals who are independent for all basic and instrumental ADLs, irrespective of having diseases or otherwise. Individuals at risk of becoming frail retain their independence but have chronic conditions that predict functional decline, such as multiple comorbidities, sarcopenia or mild neurocognitive disorder. Frail individuals exhibit functional decline[2].

On the statistical analysis, the normality of the continuous variables was checked using the Kolmogorov-Smirnov test. Continuous variables displaying a normal distribution were expressed as mean and standard deviation, whereas categorical variables were expressed as absolute number and percentage. Categorical variables were compared

using Pearson's chi-square test or Fisher's Exact test, depending on the proportion of expected frequencies <5. Development of frailty was determined based on change in functional status between baseline and follow-up. Although two different methods (VS-Frailty and IVCF-20) were used for comparing functional status, they have a high positive correlation, given that both are designed to identify older individuals who are frail[12].

The Poisson Regression model with robust variance was employed to explore the relationship of change in functional risk (worsening or stable risk of vulnerability) with the categories of the IVCF-20. Predictor variables with a p-value of <20% (p<0.20) on the bivariate analysis were added one by one into a multivariate regression model using the forward method. Non-significant variables were excluded and a new variable included reiteratively until inclusion of all variables. The procedure was repeated until all variables present in the model were statistically significant (p<0.05). The Hosmer-Lemeshow test was used to check the goodness-of-fit of the final model. The relative risk (RR), with a 95% confidence interval (95%CI), was used as the measure of effect. For all statistical analyses, a level of significance of p<0.05 was adopted. Given that the sample could not be calculated *a priori* because the number of patients enrolled and contactable by telephone was pre-defined, analysis of the power of the tests (post-hoc) was performed using the G*Power 3.1 software, where a minimum power of 80% was defined.

The study was approved by the Research Ethics Committee of the University (CAAE: 80295616.1.0000.5149 and approval permit no: 2422800).

RESULTS

The final sample comprised 64 older adults, of which 40 (62.5%) were female. Participants had a mean age of 88.7 ±5 years and 27 (42.2%) were nonagenarians or centenarians. Three individuals (4.7%) became infected by the coronavirus during the study period, 2 of whom became frail following the infection. However, none of these patients died as a result of SARS-COV-2. One year prior to the pandemic, 98.4% of participants were non-frail and only 1 (1.6%) individual (a centenarian) was frail.

Frailty incidence during the pandemic was 20.6% (13 individuals) (Table 1).

Comparison of the IVFC-20 regarding development of frailty (Table 2) revealed no group differences only for the variables falls (p=0.092) and reach, grasp and pincer grip (inability to raise arms above shoulder level (p=0.052) and inability to handle/hold small objects (p=0.289). Test power was high for variables exhibiting statistical significance, except for the variables no longer bathes alone or does domestic chores (0.34 and 0.73, respectively).

The analysis of Poisson Regression of robust variance exploring the association of frailty (presence or otherwise) with the IVCF-20 domains revealed a 2.39 times greater frailty incidence in individuals who experienced worsening of forgetfulness, 4.94 greater in those reporting loss of interest/pleasure in activities, and 2.4 times greater incidence in participants with fecal/urinary incontinence (Table 3).

Table 1. Development of frailty of oldest old during SARS-COV-2 pandemic. Belo Horizonte, Brazil 2020 – 2021.

Frailty status	Baseline	Follow-up	Frailty incidence
	N (%)	N (%)	N (%)
Non-frail	63 (98.4)	50 (78.1)	+13 (20.6)
Frail	1 (1.6)	14 (21.8)	

Table 2. Comparison of oldest old developing and not developing frailty, by domain and respective items of IVCF-20, during covid-19 pandemic. Belo Horizonte, Brazil 2020 – 2021.

IVCF-20 domains	Developing frailty (n=13)	Not developing frailty (n=51)	p-value*
Age			
≥ 85 years	13 (100%)	33 (64.7%)	0.013[a]
Self-rated health			
Fair or poor	8 (61.5%)	7 (13.7%)	< 0.001[a]
Dependence for IADLs			
No longer does shopping	8 (61.5%)	6 (11.8%)	< 0.001[a]
No longer controls money	5 (38.5 %)	3 (5.9%)	< 0.001[a]
No longer does domestic chores	4 (30.8%)	3 (5.9%)	0.010[b]
Dependence for BADLs			
No longer bathes alone	2 (15.4%)	1 (2.0%)	0.041[b]
Cognition			
Forgetfulness perceived by others	9 (69.2%)	8 (15.7%)	< 0.001[a]
Recent worsening of forgetfulness	6 (46.2%)	3 (5.9%)	< 0.001[a]
Forgetfulness impacting daily activities	6 (46.2%)	1 (2.0%)	< 0.001[a]
Mood			
Despondency, sadness or hopelessness	12 (92.3%)	15 (29.4%)	< 0.001[a]
Loss of interest/pleasure in activities	9 (69.2%)	4 (7.8%)	< 0.001[a]
Mobility			
Inability to raise arms above shoulder level	5 (38.5%)	4 (7.8%)	0.052[a]
Inability to handle small objects	1 (7.7%)	1 (2.0%)	0.289[b]
Aerobic capacity – weight loss	6 (46.2%)	9 (17.6%)	0.030[a]
Walking difficulties	6 (46.2%)	4 (7.8%)	0.001[a]
Falls	4 (30.8%)	6 (11.8%)	0.092[b]
Fecal/urinary incontinence	9 (69.2%)	9 (17.6%)	<0.001[a]
Communication			
Vision problems	7 (53.8%)	6 (11.8%)	0.001[a]
Hearing problems	7 (53.8%)	10 (19.6%)	0.003[a]
Multiple comorbidities	8 (61.5%)	15 (29.4%)	0.031[a]

*Chi-squared test; [a]: test power ≥0.80; [b]: test power <0.80. IVCF: Clinical-functional vulnerability index; IADLs=Instrumental Activities of Daily Living; BADLs=Basic Activities of Daily Living

Table 3. Poisson Regression analysis with robust variance for development of frailty during covid-19 pandemic. Belo Horizonte, Brazil 2020 – 2021.

Explanatory variables	RR	95%CI	p-value
Worsening of forgetfulness			
No	1		
Yes	2.39	1.27 – 4.46	0.006
Loss of interest/pleasure in activities			
No	1		
Yes	4.94	1.98 - 12.35	0.001
Fecal/urinary incontinence			
No	1		
Yes	2.40	2.91 - 1.53	<0.001

CI = Confidence Interval; Goodness-of-fit =1.00

DISCUSSION

The present study shows deterioration for several functional domains in the sample of older adults investigated. Taken together, the speed of the declines observed (20% frailty incidence within the space of just 15 months), the temporal link with the pandemic and biological plausibility, strongly suggest that these outcomes are secondary effects of the covid-19 pandemic. Interestingly, the low rate of infection by Sars Cov-2 (4.7%) in the population studied also suggests that the infection itself (direct effect of pandemic) was not the root cause of this process of worsening frailty.

The most notable domains affected were those related to cognition (recent worsening of forgetfulness), mood (loss of interest or pleasure engaging in previously enjoyable activities) and fecal/urinary incontinence. These findings contradict the popular belief that declines in older adults during lockdown chiefly involved mobility. Studies conducted globally have shown these impacts[8,9,16,17], but scant data are available on the oldest old population in Brazil.

In the present study, the Clinical-Functional Vulnerability Index (IVCF-20) was applied for its high correlation with the multidimensional evaluation of older people[2], revealing that around 20% of the older adults assessed became frail during the study period. A previous longitudinal study conducted in Japan found a frailty incidence of 16% in community-dwelling older adults (mean age 73 years) who were robust prior to the pandemic. The study found that lockdowns and low level of physical activity contributed to greater frailty in these individuals[16].

In another study, involving a Chinese cohort, around 12% of older adults who were non-frail before the pandemic became frail during the outbreak[17]. The study found that the change in frailty transition status was associated with presence of multimorbidity and psychological distress. However, the age of the study population averaged 70 years, and frailty was evaluated using the criteria of Fried et al.[18], which are not multidimensional, covering physical aspects only.

In the present study, the population assessed was older, a factor which might explain the high incidence of frailty detected. Although age is not a determinant of frailty[19], it is a relevant predisposing factor, particularly in the oldest old[20]. Nevertheless, a 2019 meta-analysis of individuals aged ≥60 years reported an annual frailty incidence of 4.0%, as measured using the Fried et al.[18] criteria, with this rate rising to 7.0% when other frailty criteria were taken into account[21]. In another study[22], also determining incidence but stratifying by age, the frailty rate was 22.6% in Europeans aged >85 years over a 4-year period, classified using criteria of Fried et al[18]. Hence, the frailty incidence found in the present study population was relatively high, given the short timeframe of only 15 months.

Moreover, the study employed an instrument which includes questions that encompass all functional domains and not just physical aspects, an important point given that deterioration in cognition and mood were found to be associated with functional decline.

Also, a high percentage of individuals who developed frailty exhibited a worsening of mood. Approximately 92% of older adults reported sadness, despondency or hopelessness. Loss of interest and pleasure in activities was the variable which showed the strongest association with subsequent development of frailty. This finding is consistent with other studies investigating mental health during the pandemic[23,24], albeit higher in magnitude.

In a previous cross-sectional study assessing psychological aspects of older people seen at a geriatrics service who were dependent for some activities found that 70% of individuals experienced low mood at least some of the time after social isolation[25]. Some studies, one involving a Chinese cohort[17] and another in a Japanese population[26], also found increased psychological distress in individuals who become frail and greater depressive symptoms attributed to social isolation, respectively. Those older adults with depressive symptoms were more prone to cognitive decline and decreased performance of ADLs[26]. It is believed that the conflicting information conveyed by official health channels in Brazil may have negatively impacted mental health.

Cognitive decline was also evident as a characteristic in the group of older adults who became frail. Studies prior to the pandemic had showed a relationship between social isolation and cognitive function. In a 2-year cohort study involving over 2,000 healthy older people on the Cognitive Function and Ageing Study-Wales, social isolation was associated with cognitive reserve, and individuals with greater reserve also had greater cognitive function[27]. The same study found an association of social isolation with orientation, expression and perception, but not with memory or attention. This finding contradicts the results of a 2019 study of a sample that included 10,000 participants from the English Longitudinal Study of Aging (ELSA)[28]

showing that social isolation was associated with memory decline in older adults, consistent with the present study in which cognition was assessed by questions focused on memory only.

Memory is related with capacity for execution, motor ability and functional activity, and is deemed one of the most complex domains[29]. Consequently, memory deficits have a negative impact on functioning in older people. Social isolation implies lower social interaction and, hence, lower cognitive stimulation among older individuals who, besides having lower cognitive reserve, encounter difficulties maintaining social contact using other channels of communication that are not face-to-face.

Fecal/urinary incontinence, another domain assessed on the IVCF-20, is a common condition in the older population that is associated with functional decline and frailty[30]. In the present study, the incidence of frailty was associated with incontinence, although urinary incontinence was not distinguished from fecal incontinence. Previous evidence shows that functional disability is a risk factor for urinary incontinence in older adults[30], but also a consequence of this problem.

In a study of non-institutionalized participants from The Irish Longitudinal Study on Ageing (TILDA)[30] without severe cognitive impairment, urinary incontinence was associated with ADL limitations, and also associated with loneliness and depressive symptoms. In another cross-sectional study[31], assessing community-dwelling older adults with urinary or fecal incontinence, these conditions were found to be associated with worse mental health and reduced social interaction.

In the present study, older adults exhibited cognitive decline, but the relation between incontinence and cognitive ability appears to be bi-directional[32]. Fecal/urinary incontinence has hitherto not been investigated in the literature as a possible secondary effect of the pandemic on the health of older people. However, incontinence is known to be a multifactorial condition involving physical issues (such as use of medications), as well as aspects related to mood and cognition.

Another important finding of the study pertains to sensory losses. Hearing and vision deficits are associated with worse functioning, even though this variable was not retained in the multi-causal model. A Japanese cohort study revealed greater dependence in ADLs among participants with hearing difficulty[33]. This factor was measured by self-report, as was the case in the present study. In a recent review, frailty risk was greater in older people with hearing loss, while a 4-year cohort study showed that hearing impairment was associated with higher risk of frailty[35]. Older individuals with hearing impairment also have less social interaction, possibly influencing other domains (e.g. cognition) and further increasing the risk of frailty.

The present study has several strengths, including the assessment of non-frail oldest old using an easily applied instrument for assessing functioning remotely, a critical factor during the pandemic. Moreover, although the sample was not calculated *a priori*, the power of the tests was high for the majority of the associations displaying significant differences between individuals who developed frailty and those who did not. However, the study has some limitations, such as the use of two different instruments for assessing frailty, and the absence of variables related to multi-causality of the outcome that might have better elucidated the risk factors for developing frailty. Another limitation was the fact that some participants did not possess a telephone, precluding contact. Finally, the information was collected by self-report, although many studies have used this method, including during the pandemic, yielding satisfactory results.

It is important to bear in mind that other factors, besides the covid-19 pandemic, may have influenced the functioning of the participants during the period studied. However, given the group assessed was healthy prior to the pandemic and undergoing treatment at a referral center, even throughout the pandemic (remotely in this case), social isolation imposed by the pandemic is believed to be the main factor driving the functional decline observed.

CONCLUSION

The incidence of frailty in the oldest old during the pandemic proved high. More than one domain was impacted, highlighting the need for broad assessment of older individuals as a whole, particularly during atypical periods such as the recent pandemic.

The study provided a picture of the health status of the older adults followed during a period when access to health services was impacted due to lockdown measures, which also served to ensure delivery of care interventions to those most in need of treatment. In addition, these results underscored the role of mental health aspects in this population, having implications for planning interventions to improve psychological care in this group.

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Original Articles

1 of 9

Social support and family functioning: a cross-sectional study of older people in the context of COVID-19

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Abstract

Objective: To determine the association between perceived social support and family functioning in older people during the COVID-19 pandemic. *Method:* A cross-sectional study was carried out of 72 participants aged ≥60 years enrolled at an Open University of the Third Age (U3A) in the interior of Sao Paulo state, Brazil. The variables analyzed were socioeconomic and demographic conditions, social support (Medical Outcomes Study Scale), and family functioning (Family APGAR). The Chi-Square, Mann-Whitney, and Multivariate Poisson Regression tests were used for data analysis, with a significance level of 5%. *Results:* The type of support with the highest mean scores was affectionate (95.1 points) while the lowest was emotional (87.4 points). Family dysfunction rate was 22.2%. For every additional point of affectionate support score, there was a decrease in the probability of presenting family dysfunction (OR=0.96; p=0.001). *Conclusion:* Affectionate support was associated with family functioning. These findings highlight the importance of identifying family structure, dynamics, and relationships in planning comprehensive health care for the older population.

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INTRODUCTION

The longevity of the population and consequent shift in epidemiologic and health profile renders care for the older population a complex challenge for the economic, social and health system. This holds especially true regarding the need for provision of social inclusion and support in the older population, fundamental elements for ensuring healthy aging and maintaining quality of life, well-being and satisfaction with life in old age[1,2].

In Brazil, older adults report that their social network comprises family members as the primary social system and, hence, the main source of support[3]. In this system, the relationships among individuals are built over the life course and are key determinants for family functioning, i.e. satisfaction of the members with respect to components needed for the unity and functioning of any family, namely: adaptability, partnership, growth, affection and resolve[4].

With the aging of a family member, families tend to undergo situations (e.g. divorce, increased dependence) that can upset the harmony of the relationships, leading to family dysfunction. Dysfunctional families tend to be less able to meet the physical, emotional and economics needs of older individuals, representing a potential stressor affecting quality of life of all involved (older adult and family members)[5].

Studies have identified social support for older individuals as a protective resource against stress, serving to facilitate adaptation to losses experienced with aging, such as retirement, independence of offspring, becoming widowed, financial circumstances, declines in health, and death of relatives or friends[6,7]. By contrast, social isolation can be associated with poorer quality of life, lower satisfaction with life, worse mental and physical health outcomes, cognitive decline and death[8,9]. More recently, social isolation has been recognized as a risk factor for serious health problems such as obesity and smoking[10].

Following the covid-19 pandemic, older people became increasingly isolated due to lockdown measures adopted to curb the spread of the virus, exacerbated by policies of social-distancing and inclusion of older adults as a high-risk vulnerable group[11]. Social isolation can be defined as a state in which individuals have lower social engagement with others and the community. Social distancing, on the other hand, denotes a set of actions aimed at avoiding physical contact in order to reduce spread of a disease[11].

Social distancing measures had a number of negative effects on the social well-being and mental health of the older population[12-14], increasing isolation, feelings of loneliness and directly impacting the social support received[15,16]. In Brazil, there are few studies associating family functioning and social support. Studies conducted prior to the pandemic found that older adults were part of a family system with good functioning and more support[17,18].

Good family functioning promotes the maintenance and integrity of psychological and physical health of older people, ensuring well-being, social support and health-promoting life styles[19,20]. Amid the pandemic, it is assumed that older people whose family relationships were impacted received poorer or no social support. Thus, knowledge on family functioning of older people can help inform health professionals implement the necessary actions and interventions for each family, promoting a strengthening of family relationships.

In this respect, understanding social support and family functioning of older adults during the pandemic is paramount, given that these relationships can inform policymakers and health professionals in devising social support interventions during this period when older adults face a greater risk of loneliness, depression, and social isolation.

Therefore, the objective of this study was to determine the association between perceived social support and family functioning in older adults enrolled at an Open University for the Third Age (U3A) during the COVID-19 pandemic.

METHOD

A cross-sectional analytical study at an Open University of the Third Age (U3A) in the city of Campinas, São Paulo state, was conducted. The U3A

is a program promoting activities including education, interaction, social inclusion and recuperation of autonomy, contributing to the physical, emotional and social health of older individuals. The U3A investigated in the present study emerged as an alternative to prepare workers of public university for pre-retirement, retirement and post-retirement, but expanded to include the community as a whole in Campinas city.

The study was designed according to the guidelines of the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement. The STROBE items outline the recommended content of studies, which should include title, Abstract, Introduction, Methodology, Results and Discussion sections, facilitating the understanding of the information reported.

The sample size was calculated using the software G*Power 3.1.9.2, based on a level of significance of 5%, test power of 80%, effect size of 0.15, and additional margin of 20% for potential losses, giving a minimum number of participants of 66.

For sample access and selection, the researchers were provided with support by the administration of the U3A, who sent out study participation invitations and a form collecting name, age, telephone number and availability for scheduling a call via telephone or WhatsApp. Sample selection was performed by convenience: only individuals who answered the questionnaire and expressed interest in taking part were interviewed. Inclusion criteria were being a participant at the U3A and aged ≥60 years. Individuals who failed to answer after 3 contact attempts were excluded from the study.

Participants were initially contacted via WhatsApp through a message describing the study, the researchers involved and dates and time for scheduling an interview. When an individual answered, data collection was carried out by making a telephone call, during which the study questionnaire was applied containing questions collecting information on demographic, socioeconomic and health status. Data collection was carried out during the period spanning from November 2020 to May 2021, via sessions lasting 30-60 minutes.

The variables analyzed were: age (continuous), gender (female; male), marital status (married; single; widowed; divorced/separated), education (≤12 years: >12 years), income (<4 minimum wages; 4-10 minimum wages; >10 minimum wages), living alone (no; yes), number of members of (continuous) and satisfaction with social network (no; yes), family dysfunction (no; yes) and social support (continuous).

The Family APGAR (**A**daption, **P**artnership, **G**rowth, **A**ffection, **R**esolve) is a scale for measuring family functioning. Performance on the scale ranges from 0-10 points, with a score of 0-6 indicating family dysfunction and 7-10 good family functioning[4].

Perceived social support was measured using the Social Support Survey instrument from the Medical Outcomes Study (MOS), comprising 19 items covering 5 functional domains: material support; affectionate support; positive social interaction; and emotional/informational support. Scoring ranges from 20 to 100 points, with higher scores indicating greater level of social support[21]. The Cronbach alpha coefficient for the support types is 0.83-0.91, demonstrating good internal consistency.

The data were keyed into the RedCap platform. Qualitative variables were expressed as absolute and relative numbers, and quantitative variables as means, medians and standard deviation (SD). The dimensions of the Social Support Survey from the MOS were tested for normality using the Shapiro-Wilk test. For data analysis, the Chi-squared and Mann-Whitney tests were used to compare proportions and medians, respectively. Multivariate Poisson regression was used to analyse the association of family functioning with explanatory variables. The level of significance adopted for statistical tests was a p-value of < 5%.

The study conformed to Resolution Nos. 466/2012 and 510/2016. The research project was approved by the Research Ethics Committee of Unicamp (Permit no. 4.152.788/2020). All participants gave verbal consent to take part in the study, after checking the free and informed consent form. The verbal authorizations were filed on a cloud storage platform.

RESULTS

A total of 72 participants were assessed in the study. Regarding profile of respondents, 81.9% were female, mean age was 67.6 years, number of social network members averaged 9.7 people, 50% were married, 80.9% reported education >12 years, 45.6% had an income of 4-10 minimum wages, and 37.5% lived alone. Family dysfunction rate was 22.2%. Although not reaching statistical significance, higher rates of dysfunction were seen in participants who were male (38.5%), single (37.5%), lived alone (29.6%), low-educated (30.8%), with a low income (33.3%) and family dissatisfaction (25%) (Table 1).

A summary of measurement of scores on the Social Support Survey for each of the 5 dimensions according to family functioning is given in Table 2. Results show that the highest scoring support type was Affectionate and the lowest was Emotional. A statistically significant difference is evident in median scores for all types of support according to family functioning categories, where participants with family dysfunction scored lower than those with good functioning.

Table 1. Characteristics of participants according to family dysfunction, socioeconomic and demographic conditions. Open U3A, Campinas, Sao Paulo state, 2020-2021. (n=72)

Variables	Total n (%)	Family Dysfunction		p-value
		No n (%)	Yes n (%)	
Sex				0,120
Female	59 (81.9)	48 (81.4)	11 (18.6)	
Male	13 (18.1)	8 (61.5)	5 (38.5)	
Age (Mean ± SD)	67.6 (5.2)	68.1 (5.4)	66 (4.3)	0.165
Marital status				0.517
Married	36 (50.0)	27 (75.0)	9 (25.0)	
Single	8 (11.1)	5 (62.5)	3 (37.5)	
Widow(er)	15 (20.8)	13 (86.7)	2 (13.3)	
Divorced/separated	13 (18.1)	11 (84.6)	2 (15.4)	
Living alone				0.242
No	45 (62.5)	37 (82.2)	8 (17.8)	
Yes	27 (37.5)	19 (70.4)	8 (29.6)	
Education				0.313
≤ 12 years	13 (19.1)	9 (69.2)	4 (30.8)	
>12 years	55 (80.9)	45 (81.8)	10 (18.2)	
Income*				0.156
<4 minimum wages	24 (35.3)	16 (66.7)	8 (33.3)	
4-10 minimum wages	31 (45.6)	27 (87.1)	4 (12.9)	
>10 minimum wages	13 (19.1)	11 (84.6)	2 (15.4)	
Number of members in social network (Mean ± SD)	9.7 (7.2)	10.4 (7.6)	7.3 (5.1)	0.151
Satisfaction with family				0.776
No	8 (11.3)	6 (75.0)	2 (25.0)	
Yes	63 (88.7)	50 (79.4)	13 (20.6)	
Total	72 (100.0)	56 (77.8)	16 (22.2)	

SD:Standard deviation; *Minimum wage = R$ 1,100.00. **Source:** authors (2021)

Table 2. Mean and median scores, minimum and maximum values on Social Support Survey according to support type and family functioning in participants. Open U3A, Campinas, Sao Paulo state, 2020-2021. (n=72)

Social Support Type	Good family functioning			Family Dysfunction			p-value
	Mean (SD*)	Median	Min – Max	Mean (SD*)	Median	Min – Max	
Material	89.6 (16.7)	100.0	25.0 – 100.0	62.5 (27.1)	56.3	25.0 – 100.0	0.001
Affectionate	95.1 (11.3)	100.0	50.0 – 100.0	71.1 (27.2)	66.7	25.0 – 100.0	<0.001
Emotional	87.4 (17.8)	93.7	31.3 – 100.0	61.5 (22.9)	56.3	25.0 – 100.0	<0.001
Informational	87.2 (18.5)	100.0	37.5 – 100.0	60.7 (18.6)	56.3	25.0 – 100.0	<0.001
Positive Social Interaction	87.3 (15.9)	100.0	31.3 – 100.0	68.3 (26.1)	68.8	25.0 – 100.0	0.003

*SD: Standard deviation. **Source:** authors (2021).

On the univariate analysis, all types of support were associated with family functioning (Table 3). Following application of the multivariate Poisson regression model, affectionate support remained associated with family functioning (PR=0.96; p=0.001), after adjusting for sex and age. For every extra point on the affectionate support score there was a 4% decrease in the probability of presenting family dysfunction.

Table 3. Univariate analysis of factors associated with family functioning in participants. Open U3A, Campinas, Sao Paulo state, 2020-2021. (n=72)

Variable	PR	p-value
Sex (female)	0.48	0.179
Age (continuous)	0.93	0.216
Marital status		
Married	1.00	
Single	1.55	0.543
Widow(er)	0.53	0.421
Divorced/separated	0.61	0.535
Living alone (yes)	1.66	0.307
Education (>12 years)	0.59	0.374
Income (minimum wages*)		
<4	1.00	
4-10	0.39	0.121
>10	0.46	0.328
Number of members in social network (Continuous)	0.94	0.199
Satisfaction with family (yes)	1.21	0.801
Social support type		
Material	0.97	0.001
Affectionate	0.97	<0.001
Emotional	0.96	0.001
Informational	0.97	0.004
Positive Social Interaction	0.96	0.001

*Minimum wage = R$ 1,100.00. **Source:** authors (2021)

DISCUSSION

The study results revealed that the older people, students of the U3A, with family dysfunction had lower median scores for all types of social support.

These results are noteworthy given that the family is an important source of social support for older adults, representing a place for building lasting bonds, provision of care and attention, and an entity promoting quality of life and social development[18]. In addition, modifications in family organization and the need to adapt can be conflicting, exerting a negative impact on relationships between family members and on the family structure[18, 22].

Dysfunctional families tend to report the absence of a support network, distance between members, lack of respect and reciprocity, as well as ineffective dialogue at times of crisis or otherwise. Under these conditions, support for the older individual may be impaired, causing a range of psychological, emotional, social and physiological consequences, directly impacting the older person's perceived health and health status[2,18,23].

When family interaction deteriorates, there is weakening of social ties and this may adversely impact the life of older people. A lack of social support in older age can promote negative repercussions for the life of the individual, including social vulnerability, isolation, functional impairment and early death[9,18].

Although the literature reports that family dysfunction impacts social support in older people[3, 17, 18, 23, 25], it is unclear which types of social support are associated with good family functioning. In the present study, only affectionate support, which involves showing love and affection, value and interest, was associated with family functioning. The results suggest that older individuals who report having good affectionate support have lower odds of presenting family function. A recent study also found that affectionate support was reported as more important and perceived by older adults than other dimensions of social support, underscoring the key role of affection for older people in feeling supported and in building functional social bonds[26].

This finding is corroborated by the results of the present study which found highest scores for affectionate support and lowest scores for emotional/informational support. A similar finding was identified in a study investigating the roles of different sources of social support for emotional well-being among older Chinese individuals. Higher levels of family support were associated with emotional and informational support[27], suggesting that receiving more emotional support can promote feelings of greater closeness to their family members, thereby increasing the level of perceived social support[28].

Most studies analyzing the health impact of different types of social support in older people focus on its moderating effect in reducing depressive symptoms, anxiety and loneliness in senior citizens[7, 27, 29]. According to a systematic review, emotional and instrumental support are the types which most protect older individuals from depressive symptoms[29]. Low emotional support is also associated with cognitive impairment in older people[30].

Cugmas et al.[14], in a longitudinal study performed during the COVID-19 pandemic found the older adults had greater emotional support and lower instrumental support, emphasizing the need for support for older adults with low informational social support, given the difficulty this group encounters in having adequate sources of support.

In this context, affectionate and emotional support, involving the feelings of older individuals regarding their next-of-kin, such as love and respect, and informational support, defined as assistance in dealing with a problem or advice [18], are types of support that should be priority goals in social and health interventions for the older population. Fostering these types of support within the family unit should be encouraged by health professionals.

With regard to family functioning, amid the COVID-19 pandemic, the families of older individuals needed to change their routines in order to provide the elder with support, such as food shopping, purchase of medications or other necessities, placing extra demands on the support network in an effort to safeguard these individuals[31].

Consistent with previous studies, most participants (77.8%) reported good family functioning[17, 18, 24, 25]. According to a recent study investigating sources of social support during the pandemic[31], older individuals tend to perceive higher levels of family support compared to other age groups, a factor which appears to have been protective in coping with negative emotions during the pandemic period.

In the present study, the prevalence of family dysfunction was higher than in another survey carried out at a U3A[25]. Ferreira et al.[25] (2019) found a family dysfunction rate of only 7.4% among older adults enrolled at the university in a similar group to that assessed. This suggests the COVID-19 pandemic may have changed family dynamics and consequently impacted family functioning and reduced perceived social support during the period.

In this regard, participation of older individuals in settings which promote social interactions and acquiring of new knowledge represent important strategies for ensuring social support that extends beyond family relationships, positively influencing emotional and psychological state[25]. Relationships built upon reciprocity, trust and cooperation can lead to a significant improvement in the quality of life of older people[24].

Szczesniak et al.[16] (2020) showed that, although feelings of social isolation have a negative impact on life satisfaction of older adults, this relationship may be altered by empowering seniors' self-esteem through their involvement in lifelong learning.

Engagement of older adults in activities promoted by U3A have a moderating role in reducing feelings of loneliness and increasing satisfaction with life[16]. Thus, programs which support the development of social relationships among older individuals gain even greater importance in a pandemic situation, during which perceived family support by older people appears to have been affected.

In this respect, an important implication of this study for Gerontology is the sensitization of professionals on the need to establish care plans for older people that incorporate actions which stimulate learning and the expansion of social support networks, while also reducing family dysfunction. In addition, by mapping the social and health entities that can become part of the support network of the older population, particularly U3A, health professionals can help implement a line of integrative care for older people.

This study has some limitations that should be mentioned. The study is based on a sample of older individuals with specific characteristics, limiting the generalization of findings to other contexts (e.g. community-dwelling older adults with low education and income). The study results cannot be interpreted as causal, given the nature of the study and type of analysis performed. Another potential limitation includes the inherent difficulties of interpreting data collected over the telephone. Nevertheless, assessment of the data obtained using the Social Support Survey from the MOS showed satisfactory internal consistency for the population studied.

CONCLUSIONS

The study results revealed that participants with family dysfunction had lower median social support scores than individuals with good family functioning. The study also found an association between affectionate support and family functioning, emphasizing the importance of assessing perceived social support and functioning of families. This is because the family constitutes an important source of support for older individuals and knowledge of the family structure and dynamic can aid health professionals in care planning and management.

The current findings highlight the need for future longitudinal studies exploring the relationship between social support and family functioning over time, which can help inform programs and policies for older adults with family dysfunction as a source of social support and health.

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