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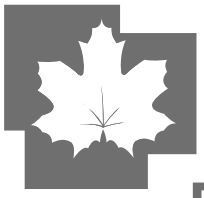

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Contents

Health, citizenship and older adults in the context of ageism

The concept of health incorporates multiple meanings which overlap the natural state: as a social and cultural construct in the dimensions of everyday life from inter and trans-disciplinary perspectives; as a product of living conditions in a complex web of relations which man establishes between himself and nature through the act of work; and as a social right of citizenship.

It is important to point out that social recognition, as part of the fight for rights, goes beyond the strictly sectoral notion of formulating health policies, but serves as an element that permeates all government social policies, whereby the right to health is regarded not only as the right to access health services, but also the right to dignity in life.

In this sense, citizenship as a guarantee for a set of liberties, rights and duties established in a society should not be left to the government to define as it sees fit, but encompass articulations with social movements and the struggle for rights, which in turn calls for protagonism and the constitution of active individuals.

It is therefore necessary to strengthen the spaces supporting democratization and participation, albeit in the form of legal/institutional management boards or other entities which foster the participation of civil society.

The current scenario, with advances in the legal sphere regarding recognition of health as a citizen´s right, raises numerous challenges in overcoming the gap between the formality of laws and the awareness and practice of social subjects. Citizenship, in its capacity as a measure of civilization that is constantly evolving in society requires, in order to thrive, a direct (active) form of participation, fueled both by the struggle to secure rights and to exercise them when held[1].

These challenges include the need to create open forums for reflection on the context of ageism, proposing alternatives that can modify negative thoughts (stereotypes), feelings (prejudices) and attitudes (discrimination) held about older age.

Ageism, a term defining stereotyping, prejudice and discrimination towards individuals on the basis of age, is a complex and multidimensional phenomenon which can take on structural (institutional), interpersonal (relational) or self-inflicted (directed toward oneself) forms[2]. It is important to debunk the notion that older people are part of a homogenous vulnerable stratum of the population, and to broaden understanding about the heterogeneous and singular nature of the aging process.

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In this context, a specific aspect warrants particular attention owing to the dearth of studies on the issue: the effects of layers of prejudices on the health of older adults. Such stigmas, still prevalent in society, perpetuate negative stereotypes and demeaning attitudes. It is important to listen to what older individuals – many of whom are black, gypsy (Romani), indigenous, LGBTQIAP+, obese, or people with disabilities – have to say about their coping strategies in the face of daily challenges and difficulties, and about their ability to mobilize as a collective resistance to promote trust, respect and esteem[3].

Although historic social struggles have helped further citizens´ rights, people rarely exercise, demand or make avail of these rights. A naturalized view of situations still predominates, where citizenship is not exercised to the full. In fact, citizenship is something which must be won, involving consolidation of democracy, transformations of government institutions, and changes in societal culture. One of the major challenges lies in articulating institutional changes with the creation and expansion of democratic practices and a culture of citizenship, particularly among (and with) older people.

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REFERENCES

1. Costa MIS, Ianni AMZ. O conceito de cidadania. In: Individualização, cidadania e inclusão na sociedade contemporânea: uma análise teórica. São Bernardo do Campo, SP: Editora UFABC, 2018, p. 43-73. https://doi.org/10.7476/9788568576953.0003.
2. Officer A, Thiyagarajan JA, Schneiders ML, et al. Ageism, healthy life expectancy and population ageing: how are they related? Int. J. Environ. Res. Public Health. 2021; 17(9):3159. https://pubmed.ncbi.nlm.nih.gov/32370093/.
3. Lima RRT, Costa MV, Vilar RLA, Castro JL, Lima KC. Identificando necessidades e possíveis soluções: com a palavra, pessoas idosas na Atenção Primária à Saúde. Saúde debate. 2018; 42(119):977-989. https://doi.org/10.1590/0103-1104201811915

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Clinical predictors of frailty in users of Secondary Care in Geriatrics and Gerontology

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Abstract

Objective: To analyze the health predictors associated with frailty in the older population treated at a Secondary Care Service in Geriatrics and Gerontology, Belo Horizonte, Minas Gerais state, Brazil. *Methods*: A cross-sectional observational study involving a sample of 4,323 individuals aged 60 years or older that underwent a clinical-functional evaluation was conducted. Sociodemographic and clinical-functional variables were analyzed and compared against the dependent variable of the study: clinical-functional stratum, as measured by the Visual Frailty Scale, dichotomized into frail and non-frail. Univariate logistic regressions were performed and the variables with p-value <0.2 were submitted to multivariate regression by stepwise and forward methods of selecting variables in the equation. *Results*: The potential explanatory value of the model was 70.4%. Seven variables were associated with frailty: age (OR 1.016; 95%CI: 1.001–1.028; p<0.001), dementia (OR 5.179; 95%CI: 3.839–5.961; p<0.001), depressive symptoms (OR 1.268; 95%CI: 1.090–1.475; p=0.002), urinary incontinence (OR 1.330; 95%CI: 1.153–1.535; p<0.001), changes in gait speed (OR 1.483; 95%CI: 1.287–1.709; p<0.001), calf circumference (OR 0.956; 95%CI: 0.932–0.982; p=0.001), and BMI (OR 1.026; 95%CI: 1.008–1.044; p=0.005). *Conclusion*: Advanced age, dementia, depressive symptoms, and continence and gait changes were associated with frailty. The study results reveal an association of reduced calf circumference and increased BMI values with frailty in older adults and that dementia diagnosis had the strongest association with the frailty syndrome.

Keywords: Health of Older adults. Frailty. Precipitating Factors. Secondary Care. Cross-Sectional Studies.

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INTRODUCTION

Population aging is a global phenomenon and a process that occurs heterogeneously, being influenced by physiological, functional and socioenvironmental factors[1]. The stratification of clinical-functional profile of older adults according to level of frailty can help inform public health actions targeting the needs of this population[2].

Frailty is a complex dynamic clinical syndrome characterized by a decline in functional reserves, such as cognition, functioning and mobility, which culminates in physical, psychological and social deficits[2]. The condition is associated with reduced resistance to external stressor events. Frailty is influenced by age, genetic and environmental factors, life habits and the presence of chronic diseases. The syndrome is associated with increased functional dependence, falls, hospitalizations and mortality[4-6].

Different conceptual models have been proposed to diagnose frailty in older individuals: phenotype, cumulative and multidimensional. Fried et al. defined frailty based on "frailty phenotype", characterized by the presence of 3 or more of the following criteria: unintentional weight loss, exhaustion, slowed gait, physical inactivity and reduced muscle strength[4]. In 2005, Rockwood et al. proposed the Frailty Index (FI), a cumulative model based on the accumulation of deficits/limitations related to aging and its unfavorable outcomes[7]. The FI is a broad measure, encompassing domains such as mobility, functioning, cognition, psychological aspects and presence of comorbidities[5]. Under the multidimensional model approach, frailty is regarded as multifactorial. Thus, physiological and psychological, cognitive, socioeconomic and environmental resources have similar importance in the subject´s ability to react to external adverse events[8].

The Brazilian Consensus on Frailty in Older Adults identified challenges for assessing frailty syndrome in Brazil, such as the need for simpler methods of evaluating frailty, establishing normative cut-off values for the scales employed for use in the Brazilian population, and strategies for population-wide screening for frailty[9]. A recent study on frailty in Latin America, India and China highlighted a number of other challenges, such as significant variation in prevalence and factors associated with the syndrome[10].

In view of the gap in knowledge on the underlying factors for identifying the Frailty Syndrome, the objective of the present study was to analyze the health predictors associated with frailty in older adults treated at a public referral Secondary Care service in Geriatrics and Gerontological medicine in Belo Horizonte, Minas Gerais state, Brazil.

METHOD

A cross-sectional observational study assessing Older Adult Care Plans (PCIs), devised based on a treatment protocol of a public secondary care Geriatrics service for patients seen between November 2016 and March 2020 was conducted[11,12]. The study participants, referred by Health Centers in Belo Horizonte were treated at the Centro Mais Vida (More Life Center) of the Hospital das Clínicas of the Federal University of Minas Gerais. The PCIs, based on the Broad Geriatric Assessment (AGA) and from multi-professional care, are employed for rereferrals to the Primary Care Units (UBS) of Belo Horizonte City Hall, Minas Gerais state. Older adults classified as frail and pre-frail are referred for follow-up at the secondary care services in geriatrics and gerontology of the city of Belo Horizonte[11,12].

The data from PCIs were collected between November 2020 and August 2021. PICs of patients aged ≥60 years containing results of instruments screening for frailty: the CFVI-20 (Clinical-Functional Vulnerability Index-20), and for level of vitality/frailty: the Visual Scale of Frailty (VSF)[3,10,12] were included. Sample selection was performed consecutively. All PCIs that met the inclusion criteria were included. Subsequently, PCIs not containing information on one or more of the independent variables outlined below were excluded. The data were keyed into the REDcap platform using double-entry.

The VSF constitutes a practical simple alternative tool, accessible to the levels of health care of older people, for assessing frailty syndrome. It is based on an assessment of performance (dependence or independent) for carrying out instrumental and basic

activities of daily living (ADLs) and in the presence of chronic diseases, cognitive impairment, sarcopenia and multiple comorbidities. A score of 6-10 points identifies the individual as frail and 1-5 points as non-frail[3].

The CFVI-20 is a multidimensional frailty screening instrument which measures cognition, mood, mobility, urinary/fecal continence, communication, age, self-rated health, polypharmacy, polypathology and recent hospitalization. [8] In the present study, the domains (including scales assessing these domains) of multi-dimensional frailty from the CFVI-20 instrument were employed as independent variables.

The following independent variables were selected to assess possible determinants of health: age (full years), sex (male and female), self-rated health (dichotomized into excellent, very good and good versus fair and poor), cognition (normal cognition, mild cognitive impairment, *delirium*, dementia, depressive symptoms, and mental disorder), presence or otherwise of depressive symptoms, urinary continence, slowed gait and polypharmacy (use of ≥5 medications). Anthropometric parameters measured were calf circumference (CC) with cut-off <31cm for sarcopenia, and body mass index (BMI) categorized as underweight (< 22kg/m^2), normal weight (22-27 kg/m^2) and excess weight (>27 kg/m^2)[12]. Only the variables available in the PCIs with missing data <10% were selected for the present study.

Cognitive status was determined using the records held in the PCIs and from analysis of results on the following cognitive screening tests: Mini-Mental State Exam (MMSE), 10-drawing recognition test, 10-word list from CERAD battery, semantic verbal fluency test (animals and fruit categories (cut-off = 9 for low educational level and 13 for high educational level) and Clock Drawing Test (cut-off = 3 points) scored according to Shulman. A cut-off of 18 points was defined for low educational level and 26 points for high educational level on the MMSE, and of 4 words and 5 drawings on the 10-word list recall from the CERAD and on the 10-drawing recognition test, respectively. The cut-off points were established based on validity studies of the scales for Brazilian Portuguese.[12]

Depressive symptoms were assessed based on record of mood changes on the PCI according to results on the 15 and 5-item Geriatric Depression Scales (GDS-15 and GDS-5), whose cut-offs were defined as ≥6 and ≥2 points, respectively, to indicate presence of depression, and also on records of the 5 criteria of major depression (with compulsory presence of at least one major criteria), according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)12. The cases of cognitive decline caused by mood disorders were subdivided into depressive symptoms and mental illness, with the latter reserved for mental disorders causing cognitive decline not associated with depression.

Mobility was assessed based on the results of the following tests: Timed Up and Go Test (cut-off ≥ 20 seconds), Get up and Go Test (TUGT), Nudge test, Romberg´s Test and 4m Gait speed test (cut-off < 0.8m/s)[12]. The presence of incontinence (urinary and/or fecal), self-rated health and use of medications were determined by self-report or using information from the caregiver.

The variables age and gender were expressed as median and quartiles, whereas qualitative variables were expressed as frequency. The Shapiro-Wilk test was employed to determine normality of the distribution. The Variance Inflation Factor (VIF) was applied to analyze the possibility of multicollinearity among variables prior to regression analysis. Univariate logistic regressions were performed. Variables with a p-value <0.2 on univariate analysis were input to the multivariable model using the stepwise forward method, confirmed by the backward method, for a significance level of 0.05.

The research project was approved by the Research Ethics Committee of the Federal University of Minas Gerais under permit no. 4198546.

RESULTS

After applying the inclusion criteria, the initial sample involved 18,009 PCIs. Of this total, 4,323 were selected for analysis. Sociodemographic and clinical-functional data for the study population are presented in Table 1. The sample population had a median age of 76 years (Q1=70; Q3=82), 74.1% were

female and 54.8% rated their health as fair or poor. Regarding cognition, 47.3% had normal cognitive status and 22.6% dementia. For mobility, 46.2% of the sample exhibited slowed gait. Overall, 36.3% of the sample met criteria for frailty as measured by the VFS.

The results of univariate logistic regression are presented in Table 2. Only the sex variable failed to obtain a p-value $p<0.2$. All other variables were retained for inclusion in the multivariate model.

The results of multivariate logistic regression are presented in Table 3. Seven variables were associated with frailty: age, cognition, depressive symptoms, urinary incontinence, slowed gait, CC and BMI. The strongest association detected was with the dementia variable (OR 5.179; CI 95% 3.839 – 5.961; p<0.001). Notably, higher CC values proved protective for frailty syndrome (OR 0,956), whereas high BMI favored greater likelihood of frailty (OR 1.026; 95% CI: 1.008 – 1.044; p=0.005).

The model found was able to correctly predict 70.4% of frailty present in the study. The Variance Inflation Factor (VIF) was 1, confirming no multicollinearity among the study variables.

Table 1. Descriptive qualitative and quantitative data for study population (N= 4,323), Belo Horizonte, Minas Gerais state, 2022.

Variable	Results
Sex (%)	
Male	1,123 (25.9)
Female	3,200 (74.1)
Self-rated health (%)	
Excellent, very good, good	1,958 (45.2)
Fair, poor	2,365 (54.8)
Hospitalization (%)	
No	2,980 (68.9)
Yes	1,343 (31.1)
Cognitive status (%)	
Normal cognition	2,049 (47.4)
Mild cognitive impairment	964 (22.3)
Delirium	5 (0.1)
Dementia	977 (22.6)
Depressive Symptoms	228 (5.3)
Mental Disorder	100 (2.3)
Depressive Symptoms (%)	
No	3,125 (72.2)
Yes	1,198 (27.8)
Slowed Gait (%)	
No	2,326 (53.8)
Yes	1,997 (46.2)

to be continued

Continuation of Table 1

Variable	Results
Urinary Incontinence (%)	
No	2,871 (66.4)
Yes	1,452 (33.6)
Visual Deficits (%)	
No	2,927 (67.7)
Yes	1,396 (32.3)
Auditory Deficits (%)	
No	3,489 (80.7)
Yes	834 (19.3)
Swallowing difficulties – dysphagia (%)	
No	4,094 (94.7)
Yes	229 (5.3)
Oral health problems (%)	
No	3,230 (74.7)
Yes	1.093 (25,3)
Sleep disturbances (%)	
No	3.299 (76.3)
Yes	1.024 (23.7)
Poor Family Support (%)	
No	3,736 (86.4)
Yes	587 (13.6)
Institutionalized (%)	
No	4,263 (98.6)
Yes	60 (1.4)
Clinical-Functional Stratum (%)	
Non-frail	2,754 (63.7)
Frail	1,569 (36.3)
Age (Q1-Q3)	76 (70-82)
Body Mass Index (Q1-Q3)	27 (23.3-30.5)
Calf Circumference (Q1-Q3)	35 (32-37)

n: Number of participants expressed as absolute value: Q1: First quartile, Q3: Third quartile.

Table 2. Univariate Logistic Regressions of study population (N=4,323). Belo Horizonte, Minas Gerais state, 2022.

Variable	OR	CI (95%)	*p*-value
Age	1.046	(1.039 – 1.053)	<0.001
Sex - Male (reference)			
Female	1.020	(0.895 – 1.162)	0.768
Self-rated health			
Fair/Poor (reference)			
Excellent/very good/good	0.772	(0.682 – 0.874)	<0.001
Cognition – Normal (reference)			
Mild Cognitive Impairment	1.384	(1.181 – 1.621)	<0.001
Delirium	4.002	(0.893 –17.936)	<0.001
Dementia	5.720	(4.919 – 6.651)	<0.001
Depressive Symptoms	1.554	(1.180 – 2.048)	<0.001
Mental Disorder	3.528	(2.448 – 5.086)	<0.001
Depressive Symptoms – No (reference)	1.169	(1.029 – 1.327)	0.016
Yes			
Urinary incontinence – No (reference)	1.759	(1.562 – 1.980)	<0.001
Yes			
Slowed Gait – No (reference)			
Yes	2.368	(2.108 – 2.660)	<0.001
Calf Circumference	0.928	(0.914 – 0.942)	<0.001
Body Mass Index	0.979	(0.968 – 0.989)	<0.001

OR: Odds Ratio; 95% Confidence Interval, level of significance <0.05.

Table 3. Multivariate Logistic Regressions of study population (n= 4,323). Belo Horizonte, Minas Gerais state, 2022.

Variables	OR	CI (95%)	*p*-value
Age	1.016	(1.001 –1.028)	<0.001
Cognition – Normal (reference)			
Mild Cognitive Impairment	1.231	(1.034 – 1.466)	0.020
Dementia	5.179	(3.839 – 5.961)	<0.001
Delirium	4.578	(0.848 – 31.631)	0.075
Depression	1.329	(0.982 – 1.798)	0.066
Mental Disorder	3.372	(2.222 – 5.117)	<0.001
Depressive Symptoms			
No (reference)			
Yes	1.268	(1.090 – 1.475)	0.002
Urinary incontinence – No (reference)			
Yes	1.330	(1.153 – 1.535)	<0.001
Slowed Gait – No (reference)			
Yes	1.483	(1.287 – 1.709)	<0.001
Calf Circumference	0.956	(0.932 – 0.982)	0.001
Body Mass Index	1.026	(1.008 –1.044)	0.005

OR: Odds Ratio; reference p: <0.05; Hosmer and Lemeshow Test: p=0.783.

DISCUSSION

Results showed that age, cognitive impairment, depressive symptoms, urinary incontinence, slowed gait, lower calf circumference and higher BMI scores were independently associated with frailty of the older population assessed, corroborating the multidimensional nature of the frailty syndrome.

In fact, age is one of factors exhibiting greatest evidence of correlation with frailty syndrome[13]. A higher prevalence of frailty was observed at more advanced ages, promoted by oxidative stress of endogenous and exogenous agents. The production of cellular oxygen increases and damage to DNA changes cells with deregulation of the inflammatory process. The final consequence of this process is functional loss and frailty syndrome[14,15]

Of the different cognitive variables examined, dementia was found to have the strongest association with frailty (OR 5.179- 95%CI: 3.839–5.961; p<0.001). There is evidence in the literature of a strong association between physical frailty and cognitive decline. Petermann-Rochat et al. found a 2.08 times increase (2.20 times after adjusting for life-style factors) in the probability of dementia in frail individuals[16]. A systematic review published in 2021 by Waite et al.[17] showed that frailty may be a predictor of dementia syndromes, given that frailty can occur even before individuals present the first symptoms of dementia. The frailty syndrome may correlate with dementia conditions as measured by pro-inflammatory, muscle stressor and neurodegeneration markers. Therefore, it is possible that more frail individuals, besides presenting physical decline, may have a higher risk of functional decline due to greater proneness to dementia. Nevertheless, these associations have not been fully elucidated in the literature[17-19].

The association between frailty and depressive symptoms has been reported in other studies at referral centers, such as the study by Silva et al.[20], which found similar results (OR=1.94; 95%CI: 1.41-2.66) in a population from the north of Minas Gerais state. Aprahamian et al. observed higher self-rated frailty in older adults with depression from an outpatient clinic in São Paulo state (OR 2,75; 95%CI= 1.84–4.11)[21]. In a cohort involving 6 Latin-American countries, depression increased the risk of developing frailty by 59%[22]. An integrative review published in 2021 suggested the possibility of depression and frailty being predictors of one another, given that frailty can be a predisposing factor for depression and behavioral problems, while reduced social interaction caused by depression can lead to physical frailty[23]. The role of chronic inflammation is highlighted, since high levels of interleukin 6 (IL-6), C-Reactive Protein and tumor necrosis factor-α are associated with frailty syndrome and depressive disorders in older adults[14,24,25].

The results of the present study suggest an association between urinary incontinence and frailty (OR 1.330; CI 95%: 1.153–1.535; p<0.001), consistent with the meta-analysis of Veronese et al. showing that incontinent older adults had a 2-fold higher frailty rate than their continent counterparts (OR 2.1; 95%CI: 1.20–3.60)[26]. Frail individuals tend to present slowed gait speed and exhaustion, contributing to poorer control of pelvic floor muscles, increasing the propensity for urinary incontinence[26,27]. These individuals often experience homeostatic dysregulation, culminating in declines in functioning, mobility, balance and cognition which lead to a greater prevalence of incontinence. However, the negative effects of urinary incontinence can lead to sufficient deficit accumulation to predispose to frailty[26].

The results of the present study corroborate previous investigations exploring the association between reduced mobility and frailty. The results revealed that 46.2% of frail individuals had mobility difficulties and that these are predictors of frailty (OR=1.483; 95%CI 1.287-1.709, p<0.001). A systematic review published in 2018 showed a clear association between gait speed in older people and frailty, underscoring the importance of assessing gait which yields objective sensitive parameters for evaluating functional decline during the aging process[28]. Gait is correlated with markers of functioning and body composition which contribute to balance and independence of older people for performing activities. Slow gait is associated with poor quality of life, increased risk of comorbidities, hospitalizations, falls and death[28-31].

A recent studying comparing frail and pre-frail institutionalized older residents showed that the frail group had slower gait speed, worse performance on the TUGT and lower knee extensor strength[29]. Consequences of frailty include risk of fractures, with an estimated 70% increase found in a 2016 meta-analysis[30]. Interestingly, a cohort of individuals aged >50 years reported that high levels of physical activity over the long-term can reduce predisposition to frailty. Therefore, on a public health level, stimulating physical activity in the older population constitutes a potential intervention for reducing the likelihood of developing frailty syndrome[31].

Lower CC values were associated with frailty, congruent with results reported by Xu et al. who found a protective effect of greater CC against frailty syndrome (OR 0.159; CI 0.064–0.396, P<0.001) in Chinese older inpatients[32]. Conversely, Wei et al., showed a 2.42 times increase in risk of death in individuals with low CC[33]. There is evidence that inflammation and changes in body composition and musculoskeletal and nervous systems act synergistically as risk factors for frailty[32].

The present study showed a positive association of elevated BMI and frailty, corroborating previous reports. Xu et al. reported that higher body fat mass, measured by analyzing body composition, increased the chances of frailty[32]. In a meta-analysis conducted by Amiri, Behnezhad & Hasani, a BMI≥25 was considered a risk factor for frailty (OR 1.43; 95%CI 1.13-1.81)[34]. It is also believed that increased inflammatory levels and peripheral insulin resistance predispose to decline in functional activities[32].

The present study has several strengths, such as the fact that the PCIs were applied by trained professionals from a cohesive multi-disciplinary team; the use of appropriate clinical protocols and tools recognized and validated for use in the older population, the large number of PCIs assessed; and the sample drawn from a single Referral Center which receives patients referred by Health Centers throughout the city of Belo Horizonte.

Study limitations include the cross-sectional design, precluding determination of cause-effect relationships for the results found. Additionally, the data were obtained from analyses of medical records (PCIs), introducing a possible bias regarding the quality of the documents accessed. Given that functioning is employed in the VSF, it was necessary to exclude basic and instrumental ADLs from among the independent variables. The information collected was derived from the first visit of users in secondary care, where this may have led to a higher rate of frailty and associated factors compared with the general population and limited the generalization of the results found. Lastly, the data were collected prior to the adoption of health measures during the COVID-19 pandemic and therefore do not reflect the changes in the older population arising in this period.

CONCLUSION

The results of the present study showed the association of frailty with advanced age, depression syndromes, depressive symptoms, slowed gait and urinary incontinence, consistent with previous reports in the scientific literature. The findings also revealed an association of frailty with high BMI and lower CC, suggesting that sarcopenic obesity might be a factor associated with the frailty syndrome. However, further studies are needed to confirm this hypothesis. Also, dementia proved the variable with the strongest association with the frailty syndrome.

These results emphasize the multidimensional nature of frailty in terms of cognitive aspects and both functional and physical characteristics. The findings also highlight factors which require vigilance by society and public agents to prevent the development of frailty in older individuals and among future generations within the Brazilian milieu. Future longitudinal studies involving diverse populations are needed to provide more in-depth analyses of the multiple problems involved in health care of older people, particularly early diagnosis of frailty.

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REFERENCES

1. United Unions. World population prospects: Highlights, 2019 revision. New York: United Nations; 2019 [acesso em 10 set 2022]. Disponível em: https://population.un.org/wpp/publication/files/wpp2019_highlights.pdf
2. Gordon AL, Masud T, Gladman JR. Now that we have a definition for physical frailty, what shape should frailty medicine take? Age Ageing. 2014 Jan;43(1):8-9.
3. Moraes EN, Lanna FM, Santos RR, Bicalho MAC, Machado CJ, Romero DE. A new proposal for the clinical-functional categorization of the elderly: Visual Scale of Frailty (VS-Frailty). J Aging Res Clin Pract 2016;5(1):24-30.
4. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, Seeman T, Tracy R, Kop WJ, Burke G, McBurnie MA; Cardiovascular Health Study Collaborative Research Group. Frailty in older adults: evidence for a phenotype. J Gerontol A Biol Sci Med Sci. 2001 Mar;56(3):M146-56.
5. Rockwood K, Mitnitski A. Frailty defined by deficit accumulation and geriatric medicine defined by frailty. Clin Geriatr Med. 2011 Feb;27(1):17-26.
6. Faller JW, Pereira DDN, de Souza S, Nampo FK, Orlandi FS, Matumoto S. Instruments for the detection of frailty syndrome in older adults: A systematic review. PLoS One. 2019 Apr 29;14(4):e0216166.
7. Rockwood K, Song X, MacKnight C, Bergman H, Hogan DB, McDowell I, Mitnitski A. A global clinical measure of fitness and frailty in elderly people. CMAJ. 2005 Aug 30;173(5):489-95.
8. Moraes EN, Carmo JA, Moraes FL, Azevedo RS, Machado CJ, Montilla DE. Clinical-Functional Vulnerability Index-20 (IVCF-20): rapid recognition of frail older adults. Rev Saude Publica. 2016 Dec 22;50:81.
9. Lourenço RA, Moreira VG, Mello RGB, Santos IS, Lin SM, Pinto ALF, et al. Brazilian consensus on frailty in older people: concepts, epidemiology and evaluation instruments. Brazilian consensus on frailty in older people: concepts, epidemiology and evaluation instruments. Geriatr Gerontol Aging. 2018;12:121-135.
10. Llibre Rodriguez JJ, Prina AM, Acosta D, Guerra M, Huang Y, Jacob KS, Jimenez-Velasquez IZ, Salas A, Sosa AL, Williams JD, Jotheeswaran AT, Acosta I, Liu Z, Prince MJ. The Prevalence and Correlates of Frailty in Urban and Rural Populations in Latin America, China, and India: A 10/66 Population-Based Survey. J Am Med Dir Assoc. 2018 Apr;19(4):287-295.e4.
11. Moraes EN, Cintra MTG. Avaliação Geriátrica. In: Malloy-Diniz LF, Fuentes D, Cosenza R. Neuropsicologia do Envelhecimento: uma abordagem multidimensional. Porto Alegre: Artmed; 2013. p. 297-322.
12. Moraes, EN. Atenção à saúde do idoso: aspectos conceituais. Brasília: Organização Pan-Americana de Saúde; 2012.
13. He B, Ma Y, Wang C, Jiang M, Geng C, Chang X, Ma B, Han L. Prevalence and Risk Factors for Frailty among Community-Dwelling Older People in China: A Systematic Review and Meta-Analysis. J Nutr Health Aging. 2019;23(5):442-450.
14. Soysal P, Stubbs B, Lucato P, Luchini C, Solmi M, Peluso R, Sergi G, Isik AT, Manzato E, Maggi S, Maggio M, Prina AM, Cosco TD, Wu YT, Veronese N. Inflammation and frailty in the elderly: A systematic review and meta-analysis. Ageing Res Rev. 2016 Nov;31:1-8.
15. Fhon JRS, Rodrigues RAP, Santos JLF, Diniz MA, Santos EBD, Almeida VC, Giacomini SBL. Factors associated with frailty in older adults: a longitudinal study. Rev Saude Publica. 2018 Jul 26;52:74.
16. Petermann-Rocha F, Lyall DM, Gray SR, Esteban-Cornejo I, Quinn TJ, Ho FK, Pell JP, Celis-Morales C. Associations between physical frailty and dementia incidence: a prospective study from UK Biobank. Lancet Healthy Longev. 2020 Nov;1(2):e58-e68.
17. Waite SJ, Maitland S, Thomas A, Yarnall AJ. Sarcopenia and frailty in individuals with dementia: A systematic review. Arch Gerontol Geriatr. 2021 Jan-Feb;92:104268.
18. Wallace LMK, Theou O, Godin J, Andrew MK, Bennett DA, Rockwood K. Investigation of frailty as a moderator of the relationship between neuropathology and dementia in Alzheimer's disease: a cross-sectional analysis of data from the Rush Memory and Aging Project. Lancet Neurol. 2019 Feb;18(2):177-184.
19. Ma L, Chan P. Understanding the Physiological Links Between Physical Frailty and Cognitive Decline. Aging Dis. 2020 Mar 9;11(2):405-418.
20. Silva PO, Aguiar BM, Vieira MA, Costa FM da, Carneiro JA. Prevalence of depressive symptoms and associated factors among older adults treated at a referral center. Rev Bras Geriatr Gerontol 2019;22(5):e190088.
21. Aprahamian I, Suemoto CK, Lin SM, de Siqueira ASS, Biella MM, de Melo BAR, Jacob-Filho W. Depression is associated with self-rated frailty in older adults from an outpatient clinic: a prospective study. Int Psychogeriatr. 2019 Mar;31(3):425-434.

22. Prina AM, Stubbs B, Veronese N, Guerra M, Kralj C, Llibre Rodriguez JJ, Prince M, Wu YT. Depression and Incidence of Frailty in Older People From Six Latin American Countries. Am J Geriatr Psychiatry. 2019 Oct;27(10):1072-1079.

23. Lenardt MH, Falcão A de S, Hammerschmidt KSA, Barbiero MMA, Leta PRG, Sousa RL. Sintomas depressivos e fragilidade física em pessoas idosas: revisão integrativa. Rev Bras Geriatr Gerontol. 2021;24(3): e210013.

24. Vaughan L, Corbin AL, Goveas JS. Depression and frailty in later life: a systematic review. Clin Interv Aging. 2015 Dec 15;10:1947-58.

25. Arts MH, Collard RM, Comijs HC, Naudé PJ, Risselada R, Naarding P, Oude Voshaar RC. Relationship Between Physical Frailty and Low-Grade Inflammation in Late-Life Depression. J Am Geriatr Soc. 2015 Aug;63(8):1652-7.

26. Veronese N, Soysal P, Stubbs B, Marengoni A, Demurtas J, Maggi S, Petrovic M, Verdejo-Bravo C; Special Interest Group on Urinary Incontinence; Special Interest Group of Systematic Reviews and Meta-Analysis for Healthy Aging, European Geriatric Medicine Society (EuGMS). Association between urinary incontinence and frailty: a systematic review and meta-analysis. Eur Geriatr Med. 2018 Oct;9(5):571-578.

27. Wang CJ, Hung CH, Tang TC, Chen LY, Peng LN, Hsiao FY, Chen LK. Urinary Incontinence and Its Association with Frailty Among Men Aged 80 Years or Older in Taiwan: A Cross-Sectional Study. Rejuvenation Res. 2017 Apr;20(2):111-117.

28. Binotto MA, Lenardt MH, Rodríguez-Martínez MC. Physical frailty and gait speed in community elderly: a systematic review. Rev Esc Enferm USP. 2018;52:e03392.

29. Pinloche L, Zhang Q, Berthouze SE, Monteil K, Hautier C. Physical ability, cervical function, and walking plantar pressure in frail and pre-frail older adults: An attentional focus approach. Front Aging. 2022 Dec 8;3:1063320.

30. Kojima G. Frailty as a predictor of fractures among community-dwelling older people: A systematic review and meta-analysis. Bone. 2016 Sep;90:116-22.

31. Wang Y, Li C, Ma Y, Zheng F, Xie W. Associations of physical activity participation trajectories with subsequent motor function declines and incident frailty: A population-based cohort study. Front Psychiatry. 2022 Oct 26;13:939310.

32. Xu L, Zhang J, Shen S, Hong X, Zeng X, Yang Y, Liu Z, Chen L, Chen X. Association Between Body Composition and Frailty in Elder Inpatients. Clin Interv Aging. 2020 Mar 4;15:313-320

33. Wei J, Jiao J, Chen CL, Tao WY, Ying YJ, Zhang WW, Wu XJ, Zhang XM. The association between low calf circumference and mortality: a systematic review and meta-analysis. Eur Geriatr Med. 2022 Jun;13(3):597-609.

34. Amiri S, Behnezhad S, Hasani J. Body Mass Index and risk of frailty in older adults: A systematic review and meta-analysis. Obes Med. 2020 Jun;18:100196

Impact of the COVID-19 pandemic on the cognitive and motor functions of older people: a 3-year cohort study

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Abstract

Objective: To analyze the impact of the COVID-19 pandemic on the cognitive and motor functions in older people. *Method:* In this cohort study, 90 older persons underwent cognitive (Mini-Mental State Examination and Frontal Assessment Battery) and motor (Timed Up and Go test and International Fall Questionnaire) tests in two moments: before the first case of the COVID-19 pandemic have been identified in Brazil and after the end of the state of public health emergency. The multiple analysis of variance was applied with the Wilk's lambda test to verify the impact of the COVID-19 pandemic on the factors "time" (pre × post-pandemic), "group" (sex, marital status and education) and "interaction" (time × group). Effect size and statistical power are reported. Significance was set at 5%. *Results*: Older persons presented cognitive decline during the COVID-19 pandemic (effect size: 0.43; statistical power: 99.8%; p=0.001). The decline was similar according to sex (p=0.864), marital status (p=0.910) and schooling (p=0.969). The participants also suffered a motor decline during COVID-19 pandemic (effect size: 0.74; statistical power: 99.9%; p=0.001). The decline was similar according to sex (p=0.542) and marital status (p=0.260). Participants with lower educational level suffered greater physical decline than persons with higher schooling (effect size: 0.38; statistical power: 97.6%; p=0.004). *Conclusion:* The COVID-19 pandemic affected the cognitive and motor functions of older persons. Participants with low schooling suffered a greater decline of their physical health during the pandemic, a fact that should encourage further studies on this thematic.

Keywords: Pandemics. Covid-19. Aged. Delivery of Health Care. Public Health.

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INTRODUCTION

Since 2020, the world has been experiencing a health crisis caused by the Sars-Cov-2 virus, responsible for COVID-19. Characterized by a high rate of transmissibility and a high risk of complications, health authorities have recommended social isolation as the best way to prevent the disease[1]. With the advent of vaccination, the rigor of social isolation has been decreasing and the use of masks has been released by many governments[2].

In April 2022, the Brazilian government decreed the end of the state of public health emergency. The period between 2020 and 2021 was one of great turbulence in the country. Faced with conflicting disclosures from the federal government encouraging the use of drugs without scientific proof against COVID-19 and often questioning the use of masks and the importance of vaccination, the population found itself uncertain about the best path to follow[3,4].

By January 2023, more than 36 million Brazilians had been diagnosed with COVID-19. Of these, approximately 700,000 lost their lives to the disease. Estimates indicate that more than 100,000 older people were victims of COVID-19, impacted mainly by the physical weakness that the disease brings[5-7].

Previous studies indicate how the COVID-19 pandemic affected the health of older people. Research points to effects arising from physical inactivity, social isolation and sequelae caused by the disease[7-9]. Studies also demonstrate impairment of both physical and mental health[10-12]. Most works, however, addressed older people during the pandemic, not assessing people's health before and after the advent of COVID-19.

The aim of this study was to investigate the physical and mental health of older people before the first case of the COVID-19 pandemic was identified in Brazil and after the end of the public health emergency decreed by the federal government.

METHOD

This research consists of an epidemiological, cohort and analytical study carried out in the municipality of Campo Grande, state of Mato Grosso do Sul. The research was approved by the Institutional Research Ethics Committee (protocol n. 4,833,758). The ethical precepts present in Resolution number 466 of the Ministry of Health and in the Declaration of Helsinki were respected. All participants signed in writing their consent to participate in this research.

The methodological procedures are reported according to the criteria defined by the Strobe initiative. The sample was selected for convenience to ensure similar age and schooling between men and women. Participants were recruited in public environments in the city in a probabilistic and stratified manner so that all regions were covered.

The selection of participants was based on the quantitative identified by sample statistical calculation. For this, the researchers used the alpha error at 5%, the statistical power at 80% and the effect size of 0.30[13]. The inclusion of these factors in a longitudinal design formed with two evaluation moments found a critical value in the Fisher table of 4.05 and a non-centrality parameter of 8.28. The result indicated the need for 86 older participants so that type 1 (alpha error) and type 2 (beta error) statistical errors were controlled.

To be included in this study, participants should be at least 60 years old, have no neurological or psychiatric disorders or any motor problem that would prevent them from performing the tests. Subjects who during the pandemic period came to present diseases not present in the original recruitment were excluded. Deaths, address changes, lack of contact and withdrawal from participation were reported as sample losses.

The researchers initially collected personal, social, and demographic information from the participants. These constituted the research's independent variables. The variables collected at that time were: age, sex, education level, marital status and professional occupation. Then, a series of cognitive and motor tests were applied, with the aim of comparing the impact of the pandemic on the physical and mental health of the participants. These constituted the dependent variables of the research, evaluated before the first case of COVID-19 was identified in Brazil and after the end of the state of public health emergency

decreed by the federal government[14]. The period between assessments was three years.

The analysis of cognitive functions involved the Mini Mental State Examination (MMSE)[15] and the Frontal Assessment Battery (FAB)[16]. The MMSE was used to assess the participants' general cognitive aspects, such as temporal and spatial orientation, word registration, attention, calculation, immediate and delayed memory, language and visuoconstructive praxis. The test ranges from 0 to 30 points, and the lower the score, the greater the risk of the person having cognitive impairment[15].

The FAB was included because it assesses participants' prefrontal executive functions. The instrument assesses the following executive skills: conceptualization, mental flexibility, motor programming, task conflicts, inhibitory control and environmental autonomy. The instrument score ranges from 0 to 18 points, with lower scores indicating a higher risk of cognitive impairment[16]. Both in the MMSE and in the FAB, schooling was taken into account in the analysis of scores, given the impact it has on cognitive tests[17].

The physical health of the participants was analyzed using the Timed Up and Go test (TUG)[18] and the Falls Efficacy Scale – International (FES-I)[19] instrument. The TUG is a validated mobility test for the older population. The test measures the time and number of steps required for a person to get up from a chair, walk three meters, return and sit down in the chair. In the present study, the TUG was applied with and without dual-task distractors, given the impact that aging has on people's simultaneous functional activities[20]. Thus, the participants performed the test in a conventional way and also taking a glass of water (dual-task with motor distractor) or saying the names of animals (dual-task with cognitive distractor). The order of the tests among the participants was randomized so as not to cause a learning effect on the results.

The FES-I scale was applied to analyze the participants' concern about falls. The instrument measures both domestic activities and social and physical tasks performed outdoors. In this instrument, higher scores indicate greater insecurity and risk of falls.

In this research, the researchers listed the following statistical hypotheses: Null hypothesis (H_0) - The COVID-19 pandemic did not affect the cognitive and motor functions of older people; Alternative hypothesis (H_A) - The COVID-19 pandemic affected the cognitive and motor functions of older people.

Statistical analysis involved the characterization of results in mean and standard deviation (for continuous variables) and in relative and absolute frequency (for categorical variables). The researchers applied multiple analysis of variance tests for repeated measures associated with the Wilk lambda test to verify the physical and cognitive scores of participants before the COVID-19 pandemic and after the public health emergency.

Univariate analyzes were applied by dividing participants into groups according to social and demographic factors. With this, it was possible to compare the effects of the "group" factors (gender, marital status, education and professional occupation), under the variable "moment" (pre-pandemic situation × post public health emergency state) and in the interaction "group × moment". Effect size and statistical power were reported. Significance was assumed at 5%.

RESULTS

One hundred and ten participants were originally recruited for this research. Given the eligibility criteria and follow-up period, the sample was reduced to 90 participants, 65 women and 25 men. Sample losses did not compromise the minimum number of subjects delimited by the previous sample calculation.

The participants were all from the municipality of Campo Grande, state of Mato Grosso do Sul, living with their families. Table 1 demonstrates the socio-demographic characteristics of the participants.

Table 1. General characteristics of the participants (N=90). Campo Grande, MS, Brazil 2022.

Variables	Men	Women	*p*
Sample size, %	27.8	72.2	0.001
Age, years	68.1 ± 7.0	68.6 ± 7.3	0.797
Schooling %			0.297
University education	36.0	32.3	
High school	36.0	23.1	
Elementary School	28.0	44.6	
Marital status %			0.001
Single	4.0	15.4	
Married	80.0	41.5	
Divorced	4.0	13.8	
Widow(er)	12.0	29.3	
Professional occupation %			0.001
Retiree	64.0	35.4	
Homemaker	0.0	50.8	
Active	36.0	13.8	

Data are expressed as mean ± standard deviation for age and percentile for other variables. *p* values from Student's t test for age and chi-square for other variables.

Analyzing the impact of the COVID-19 pandemic on participants' cognition, a decline in cognitive functions was observed in the pre-pandemic × post public health emergency comparison. The inferential analysis identified that the impact of COVID-19 on the cognition of the older people had an effect size of 43%, under a statistical power of 99.8% and significance of 1%. The greatest decline occurred in the Frontal Assessment Battery, responsible for measuring prefrontal executive functions. Table 2 details the cognitive scores of the participants in the two evaluated moments.

By including the sex factor in the statistical model, it is observed that the cognitive values were similar between men and women (p=0.703). Cognitive decline during the pandemic occurred in both sexes (p=0.001) and at the same intensity (p=0.864).

Regarding marital status, cognitive values were similar among single, married, divorced and widowed individuals (p=0.285). There was cognitive decline in all groups (p=0.001) and at the same intensity (p=0.910).

Regarding schooling, participants with elementary education had lower cognitive scores on the MMSE and FAB than people with higher education (p=0.005). Cognitive decline occurred in participants of all educational levels (p=0.001) and at the same intensity (p=0.969).

Professional occupation did not interfere with cognitive decline. Professionally active participants had the same cognitive performance as retired or homemaker participants (p=0.956). With the follow-up period, cognitive decline occurred in all groups (p=0.001) and at the same intensity (p=0.308). Figure 1 shows participants' cognitive scores according to gender, marital status, education and professional occupation.

Table 2. Participants' cognitive scores, Campo Grande, MS, Brazil 2022.

Cognitive variables	Initial assessment	Final assessment	Effect size	Statistical power (%)	*p*
Mini Mental State Examination, pts	26.1±2.6	24.5±2.8	0.24	93.1	0.001
Frontal Assessment Battery, pts	14.4±2.8	12.2±2.9	0.35	99.4	0.001

Data are expressed as mean ± standard deviation. *p* values, effect size and statistical power from analysis of variance tests for repeated measures.

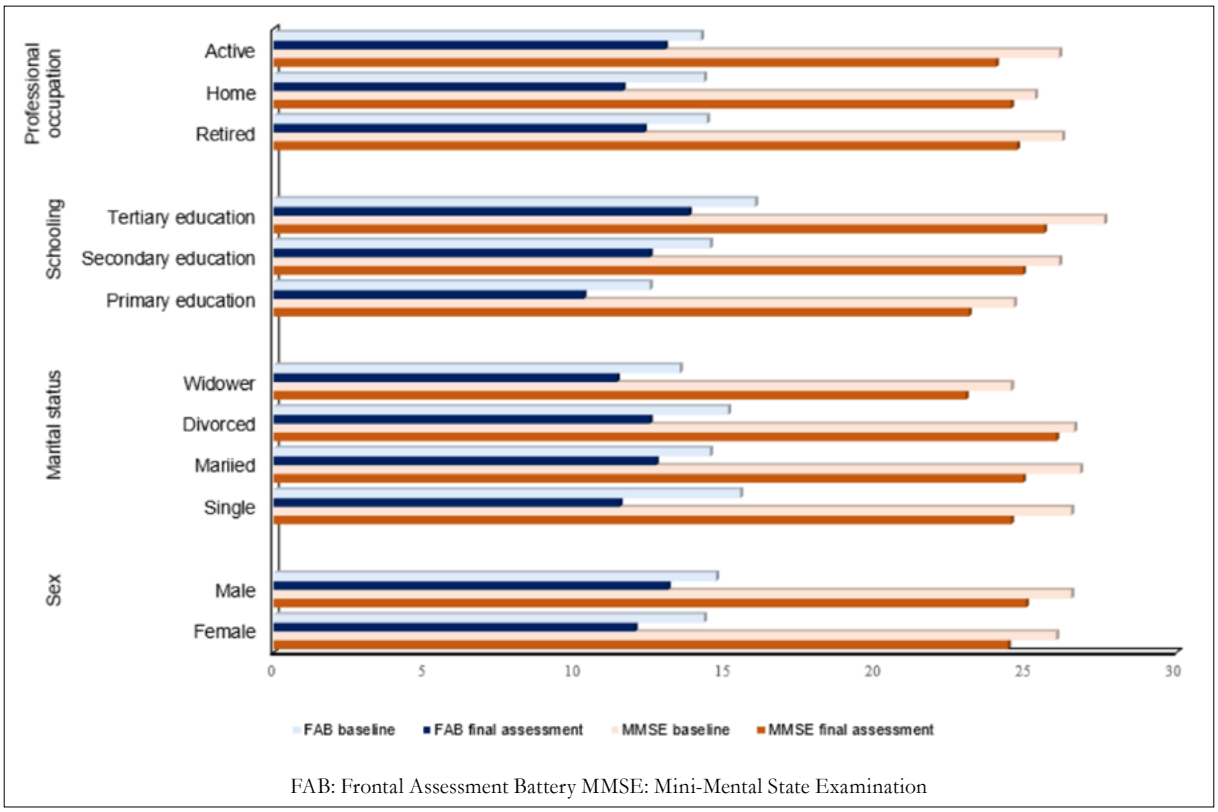


Figure 1. Cognitive scores of participants according to gender, marital status, education and professional occupation, Campo Grande, MS, Brazil, 2022.

Analyzing the impact of the COVID-19 pandemic on the physical health of the participants, a decline in scores was observed in the comparison pre-pandemic × post state of public health emergency. Inferential analysis identified that the impact of COVID-19 on the physical health of older people had an effect size of 74%, under a statistical power of 99.9% and significance of 1%. Table 3 shows the values of the TUG and FES-I tests. Univariate analyzes indicate that the impact of the pandemic was mainly on the number of steps taken in the TUG test and in the FES-I falls questionnaire ($p<0.05$).

By including the sex factor in the statistical model, it is observed that the results of the physical tests were similar between men and women ($p=0.168$). Motor decline occurred in both genders ($p=0.001$) and at the same intensity ($p=0.542$).

Regarding marital status, the motor results were similar among single, married, divorced and widowed individuals ($p=0.470$). There was motor decline in all groups ($p=0.001$) and at the same intensity ($p=0.260$).

Regarding schooling, participants with primary education had worse motor performance than people with secondary and higher education ($p=0.001$). The decline in motor functions occurred in people of all educational levels ($p=0.001$), but at different intensities. That is, people with lower levels of education showed

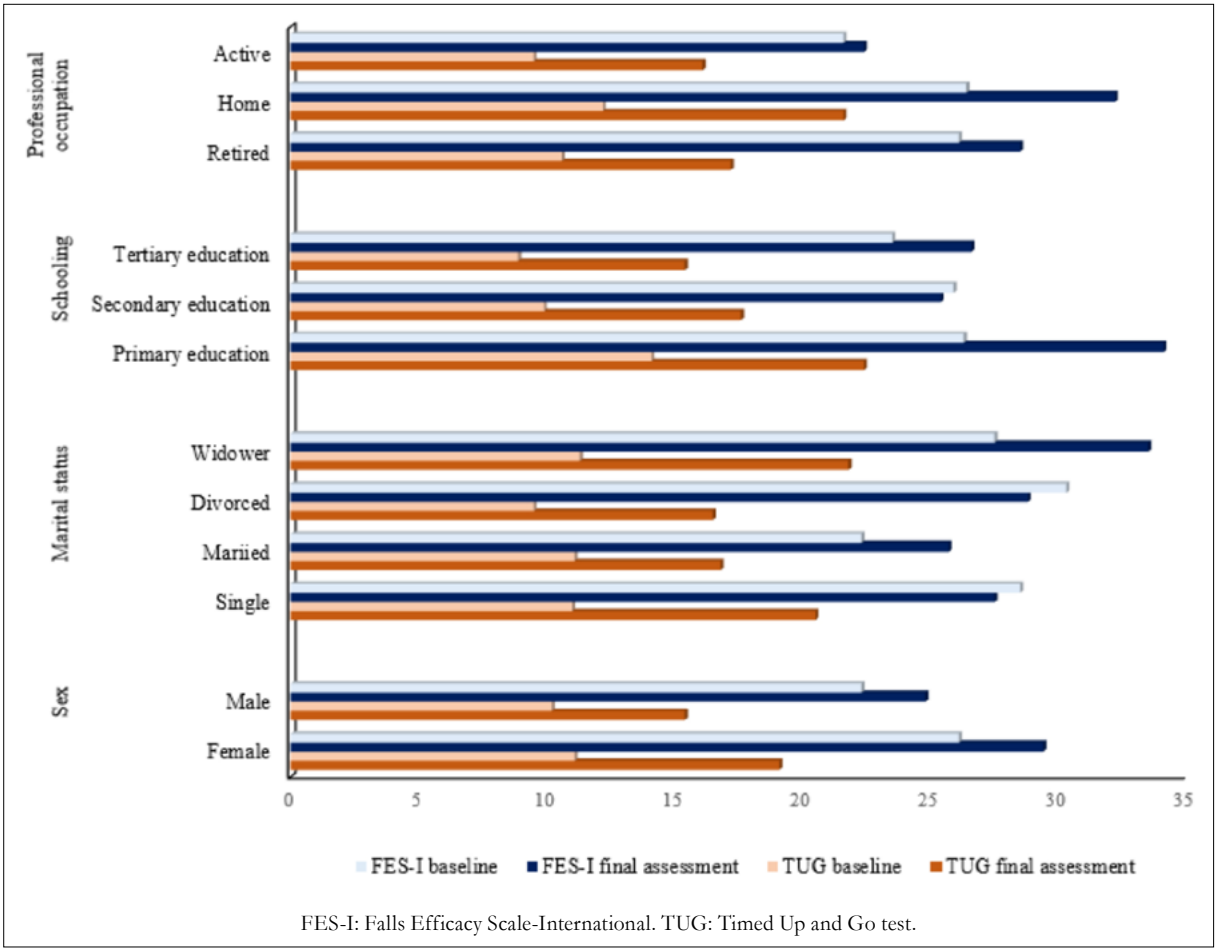
greater motor decline during the pandemic than people with higher levels of education (p=0.004).

Professional occupation did not interfere with the physical health of the participants. Active professionals had the same performance in the TUG and FES-I as retired or homemaker participants (p=0.144). With the follow-up period, motor decline occurred in all groups (p=0.001) and at the same intensity (p=0.808). Figure 2 shows the participants' physical test scores according to sex, marital status, education and professional occupation.

Table 3. Values of the physical functions of the participants, Campo Grande, MS, Brazil, 2022.

Physical variables	Task	Initial assessment	Final assessment	Effect size	Statistical power (%)	p
Timed Up and Go, time	Simple	15.0±2.7	13.9±6.6	0.05	30.3	0.147
	Motor	15.8±3.1	15.3±7.1	0.01	8.4	0.582
	Cognitive	16.5±4.6	17.2±10.1	0.01	9.8	0.516
Timed Up and Go, steps	Simple	10.8±3.5	18.3±5.9	0.74	99.9	0.001
	Motor	11.7±5.3	18.9±6.8	0.61	99.9	0.001
	Cognitive	14.2±5.5	18.0±6.4	0.35	99.4	0.001
Fall instrument, pts	Risk of falls	25.2±6.4	28.4±8.8	0.18	83.0	0.005

Data are expressed as mean ± standard deviation. p values, effect size and statistical power from analysis of variance tests for repeated measures.



FES-I: Falls Efficacy Scale-International. TUG: Timed Up and Go test.

Figure 2. Physical scores of participants according to gender, marital status, education and professional occupation, Campo Grande, MS, Brazil, 2022.

Including the variable "age" as a dependent factor in multivariate tests, it was observed that this variable did not interfere with cognitive aspects (p=0.104). Differently, age interfered with the physical health of older people. That is, older participants had worse motor responses than younger participants (p=0.001). Under a longitudinal analysis, it was found that the COVID-19 pandemic caused greater physical decline in older seniors than in younger seniors (effect size for "age × moment" interaction: 0.78; statistical power: 99.9%; p=0.001).

DISCUSSION

The aging process generates several changes in the body. These alterations involve motor and cognitive decline, which tend to affect the independence and health of the older person[21,22]. The present study was developed during the COVID-19 pandemic to verify how much the pandemic intensified the physical and cognitive losses natural to aging.

The results indicated a direct impact of the pandemic on the participants' cognitive functions. Physical decline, in contrast, has been affected by both the pandemic and aging. Gender, marital status and professional occupation had little impact on the results. Low education was a risk factor for physical decline during the pandemic. Understanding these factors is essential for providing public health policies that guarantee access to health and quality of life for the older population[23].

The assessment of cognitive functions involved the MMSE and the FAB. These instruments were chosen because they analyze both general cognitive aspects (such as temporal-spatial orientation, word registration, attention, calculation and memory) and prefrontal executive functions (known for requiring great brain connectivity and processing complexity)[24]. Thus, the inclusion of both instruments allowed a complete analysis of the participants' cognitive functions.

Table 2 details the pre-pandemic and post-state public health emergency MMSE and FAB values. Comparisons show a decline in participants' scores on both instruments during the pandemic. Even though there has been a decline in cognitive functions, the initial and final assessments show normal scores according to the cutoff scores of both instruments[25,26]. That is, cognitive decline occurred, but it was not indicative of dementia.

The inclusion of the age factor in the statistical model indicated that cognitive decline occurred exclusively due to the impact of the pandemic and little was due to physiological changes due to aging. This result is confirmed by medium- and long-term follow-up cohort studies, which indicate a longer time to justify cognitive decline caused by age[27,28].

The inclusion of social and demographic variables aimed to complement the data analysis and investigate the impact of the pandemic and these variables on people's lives. Figure 1 demonstrates that cognitive decline was similar between men and women, people in different marital situations and with different professional occupations. That is, these aspects had little impact on the decline of cognitive functions in older people.

By including social and demographic factors as independent variables, the researchers intended to strengthen the originality of this study. So far, research that has analyzed the impact of COVID-19 on mental and cognitive health has barely addressed the interference of social and demographic factors[29].

In a study carried out with 365 people, Peng *et al.*[30] identified that COVID-19 had a greater impact on the health and well-being of women than men. Married people had greater resilience during COVID-19 than single people. This result differs from that found in the present study, which observed similar responses according to gender, marital status and professional occupation. The divergent findings between studies may have occurred due to the age difference of the sample, where people aged over 60 years were approached here and the sample by Peng *et al.*[30] involved mainly adults. Differences between studies should serve as incentives for further research exploring the impact of COVID-19 on people of different age groups, gender, marital status and professional occupations.

The level of education, on the other hand, significantly interfered in the cognitive results of the participants. People with low levels of education

had lower scores on cognitive tests than people with higher levels of education (figure 1). This result was expected because the cognitive instruments have different cutoff scores according to the participants' education level[25,26]. That is, people with low literacy tend to have lower scores on cognitive instruments than people with higher levels of education.

Even though people with low education had lower initial and final values than people with higher educational levels, the longitudinal analysis showed that the difference in values was similar between groups. That is, the impact of the COVID-19 pandemic on cognitive functions was similar across different educational levels. On the one hand, this result surprised researchers, as a person's greater literacy tends to serve as a cognitive reserve mechanism and decrease cognitive decline[31]. On the other hand, the follow-up period may have been short and not sensitive to verify greater cognitive decline in one group compared to the other.

Participants' physical health was assessed using the TUG test and the FES-I scale. The researchers chose to include both instruments due to their potential to assess mobility and balance problems, so common during aging[32]. In addition, the TUG was evaluated with and without a dual-task distractor as a way to bring the mobility activity closer to the reality of the older person. As previous studies have shown motor decline in older people during the COVID-19[7-10] pandemic, the use of these instruments proved to be adequate to verify the participants' mobility and fear of falls during this period.

Table 3 details the pre-pandemic and post-state public health emergency physical test values. The analyzes prove the negative impact of the COVID-19 pandemic on the physical health of the older people, where the participants, in the end, needed to perform the activity with a greater number of steps than in the initial assessment. Carrying out the activity with a greater number of steps may demonstrate an insecurity of the older person, who needed short steps and larger support bases to perform the walk test. This finding is in line with the result of the FES-I, where, in the final assessment, the participants presented results consistent with greater fear of falls than in the initial assessment.

The inclusion of the age factor in the statistical model indicated that the physical decline of the participants was impacted by both the COVID-19 pandemic and the age of the participant. That is, the pre-pandemic and post-public health emergency follow-up period was sufficient to culminate in the physical decline of older people, whose decline was influenced by the age of the person and was intensified by the pandemic.

For this issue, the authors believe that social isolation, so important to prevent hospitalizations and deaths at a time when vaccination against COVID-19 was not yet available[33], may have intensified the physical decline of the participants. During social isolation, older people were restricted to the domestic environment and physical inactivity may have contributed to the subjects' motor decline[34].

Similar to what was found in the analyzes of cognitive functions, gender, marital status and professional occupation had little effect on the physical decline of the participants. That is, the decline was similar between men and women, people in different marital situations and with different professional occupations. Schooling, however, was a risk factor for physical decline. Statistical analysis indicated that people with a lower level of education have worse physical values than people with a higher level of education. In addition, people with less education experienced greater physical decline during the COVID-19 pandemic than people with more education.

For this question, Oehlschlaeger *et al.* [35] reported that people with lower educational levels tend to be more sedentary than people with higher educational levels. As a sedentary lifestyle has a direct impact on the physical health of older people[7,34], the authors believe that low education may be linked to a lower level of physical activity in this group, affecting the motor variables of the study.

Although this study found important results on the impact of COVID-19 on the health of older people, it has some limitations that should be taken into account by readers. The main limitation refers to the effect size of the impact of the pandemic, which was between 0.43 for cognitive variables and 0.74 for physical variables.

The effect size may have been influenced by the cognitive and physical tests chosen by the researchers. The inclusion of other tests could prove an even greater impact of COVID-19 on the lives of older people. That is, the researchers focused the analysis of mental health on cognitive aspects, not including other important aspects such as depression, anxiety level, mood and stress. The inclusion of other aspects could enhance the impact of COVID-19 on the mental health of older people and increase the size of the effect identified in this study.

Similarly, physical tests focused on mobility analysis and fear of falling. The inclusion of other factors, such as muscle strength, agility, flexibility and functional capacity could also enhance the proof of the impact of COVID-19 on the physical health of the older person.

CONCLUSION

This study identified the impact of the COVID-19 pandemic on the health of the older population, taking into account social and demographic peculiarities. Gender, marital status and professional occupation had little impact on the results. Low education was a risk factor for physical decline.

While cognitive decline was affected solely by the pandemic, physical decline was due to the association between the impact of the pandemic and the age of the participant.

The results of this study should be taken into account by professionals in the area of geriatrics and gerontology, and by health managers, with a view to proposing new health policies that guarantee health to the older population.

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REFERENCES

1. Chu DK, Akl EA, Duda S, Solo K, Yaacoub S, Schünemann HJ, et al. Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. Lancet. 2020;395(10242):1973-87. Available at: https://doi.org/10.1016/S0140-6736(20)31142-9.
2. Bartsch SM, O'Shea KJ, Chin KL, Strych U, Ferguson MC, Bottazzi ME, et al. Maintaining face mask use before and after achieving different COVID-19 vaccination coverage levels: a modelling study. Lancet Public Health. 2022;7(4):e356-65. Available at: https://doi.org/10.1016/S2468-2667(22)00040-8.
3. Santos-Pinto CB, Miranda ES, Osorio-de-Castro CGS. "Kit-covid" and the Popular Pharmacy Program in Brazil. Cad Saude Publica. 2021;37(2):e00348020. Available at: https://doi.org/10.1590/0102-311X00348020.
4. Taylor L. 'We are being ignored': Brazil's researchers blame anti-science government for devastating COVID surge. Nature. 2021;593(7857):15-6. Available at: https://doi.org/10.1038/d41586-021-01031-w.
5. Machado CJ, Pereira CCA, Viana BM, Oliveira GL, Melo DC, Carvalho JFM, et al. Estimativas de impacto da COVID-19 na mortalidade de idosos institucionalizados no Brasil. Cien Saude Colet. 2020;25(9):3437-44. Available at: https://doi.org/10.1590/1413-81232020259.14552020.
6. de Oliveira Lima H, da Silva LM, de Campos Vieira Abib A, Tavares LR, Santos DWCL, de Araújo ACLF, et al. Coronavirus disease-related in-hospital mortality: a cohort study in a private healthcare network in Brazil. Sci Rep. 2022;12(1):6371. Available at: https://doi.org/10.1038/s41598-022-10343-4.
7. Vidal Bravalhieri AA, Oliveira Rodrigues N, Batiston AP, de Souza Pegorare AB, Christofoletti G. Impact of social isolation on the physical and mental health of older adults: a follow-up study at the apex of the Covid-19 pandemic. Dement Geriatr Cogn Disord. 2022;51(3):279-284. Available at: https://doi.org/10.1159/000525661.

8. Browne RAV, Macêdo GAD, Cabral LLP, Oliveira GTA, Vivas A, Fontes EB, et al. Initial impact of the COVID-19 pandemic on physical activity and sedentary behavior in hypertensive older adults: An accelerometer-based analysis. Exp Gerontol. 2020;142:111121. Available at: https://doi.org/10.1016/j.exger.2020.111121.

9. Sepúlveda-Loyola W, Rodríguez-Sánchez I, Pérez-Rodríguez P, Ganz F, Torralba R, Oliveira DV, et al. Impact of social isolation due to COVID-19 on health in older people: Mental and physical effects and recommendations. J Nutr Health Aging. 2020;24(9):938-47. Available at: https://doi.org/10.1007/s12603-020-1469-2.

10. Damiot A, Pinto AJ, Turner JE, Gualano B. Immunological Implications of physical inactivity among older adults during the COVID-19 Pandemic. Gerontology. 2020;66(5):431-8. Available at: https://doi.org/10.1159/000509216.

11. Creese B, Khan Z, Henley W, O'Dwyer S, Corbett A, Vasconcelos-da-Silva M, et al. Loneliness, physical activity, and mental health during COVID-19: a longitudinal analysis of depression and anxiety in adults over the age of 50 between 2015 and 2020. Int Psychogeriatr. 2021;33(5):505-14. Available at: https://doi.org/10.1017/S1041610220004135.

12. de Moura AAM, Bassoli IR, Silveira BV, Diehl A, dos Santos MA, dos Santos RA, Wagstaff C, Pillon SC. Is social isolation during the COVID-19 pandemic a risk factor for depression? Rev Bras Enferm. 2022;75(Suppl 1):e20210594. Available at: https://doi.org/10.1590/0034-7167-2021-0594.

13. Guo J, Feng XL, Wang XH, van Ijzendoorn MH. Coping with COVID-19: Exposure to COVID-19 and Negative Impact on Livelihood Predict Elevated Mental Health Problems in Chinese Adults. Int J Environ Res Public Health. 2020;17(11):3857. Available at: https://doi.org/10.3390/ijerph17113857.

14. Governo Federal. Portaria GM/MS no 913, de 22 de abril de 2022. Brasília, 2022 [citado 2023 Jan 25]. Available at: https://pesquisa.in.gov.br/imprensa/jsp/visualiza/index.jsp?data=22/04/2022&jornal=612&pagina=1

15. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975;12(3):189-98. Available at: https://doi.org/10.1016/0022-3956(75)90026-6.

16. Dubois B, Slachevsky A, Litvan I, Pillon B. The FAB: a Frontal Assessment Battery at bedside. Neurology. 2000;55(11):1621-6. Available at: https://doi.org/10.1212/wnl.55.11.1621.

17. Christofoletti G, Oliani MM, Stella F, Gobbi S, Gobbi LTB. The influence of schooling on cognitive screening test in the elderly. Dement Neuropsychol. 2007;1(1):46-51. Available at: https://doi.org/10.1590/S1980-57642008DN10100008.

18. Podsiadlo D, Richardson S. The timed "Up & Go": a test of basic functional mobility for frail elderly persons. J Am Geriatr Soc. 1991;39(2):142-8. Available at: https://doi.org/10.1111/j.1532-5415.1991.tb01616.x.

19. Yardley L, Beyer N, Hauer K, Kempen G, Piot-Ziegler C, Todd C. Development and initial validation of the Falls Efficacy Scale-International (FES-I). Age Ageing. 2005;34(6):614-9. Available at: https://doi.org/10.1093/ageing/afi196.

20. Hennah C, Ellis G, Doumas M. Dual task walking in healthy aging: Effects of narrow and wide walking paths. PLoS One. 2021;16(12):e0261647. Available at: https://doi.org/10.1371/journal.pone.0261647.

21. McGrath R, Vincent BM, Hackney KJ, Al Snih S, Graham J, Thomas L, et al. Weakness and cognitive impairment are independently and jointly associated with functional decline in aging Americans. Aging Clin Exp Res. 2020;32(9):1723-30. Available at: https://doi.org/10.1007/s40520-019-01351-y.

22. Felippe LA, de Oliveiar RT, Garcia M, Silva-Hamu TCD, Santos SMS, Christofoletti G. Funções executivas, atividades da vida diária e habilidade motora de idosos com doenças neurodegenerativas. J Bras Psiquatr. 2014;63(1):39-47. Available at: https://doi.org/10.1590/0047-2085000000006.

23. Pan A, Liu L, Wang C, Guo H, Hao X, Wang Q, et al. Association of Public Health Interventions With the Epidemiology of the COVID-19 Outbreak in Wuhan, China. JAMA. 2020;323(19):1915-1923. Available at: https://doi.org/10.1001/jama.2020.6130.

24. Grundy JG, Barker RM, Anderson JAE, Shedden JM. The relation between brain signal complexity and task difficulty on an executive function task. Neuroimage. 2019;198:104-13. Available at: https://doi.org/10.1016/j.neuroimage.2019.05.045.

25. Brucki SM, Nitrini R, Caramelli P, Bertolucci PH, Okamoto IH. Sugestões para o uso do mini-exame do estado mental no Brasil. Arq Neuropsiquiatr. 2003;61(3B):777-81. Available at: https://doi.org/10.1590/s0004-282x2003000500014.

26. Beato R, Amaral-Carvalho V, Guimarães HC, Tumas V, Souza CP, Oliveira GN, et al. Frontal assessment battery in a Brazilian sample of healthy controls: normative data. Arq Neuropsiquiatr. 2012;70(4):278-80. Available at: https://doi.org/10.1590/s0004-282x2012005000009.

27. Jia F, Li Y, Li M, Cao F. Subjective Cognitive Decline, Cognitive Reserve Indicators, and the Incidence of Dementia. J Am Med Dir Assoc. 2021;22(7):1449-1455. Available at: https://doi.org/10.1016/j.jamda.2020.08.005.

28. Herrmann FR, Montandon ML, Garibotto V, Rodriguez C, Haller S, Giannakopoulos P. Determinants of cognitive trajectories in normal aging: A longitudinal PET-MRI study in a community-based cohort. Curr Alzheimer Res. 2021;18(6):482-91. Available at: https://doi.org/10.2174/1567205018666210930111806.

29. Flor LS, Friedman J, Spencer CN, Cagney J, Arrieta A, Herbert ME, et al. Quantifying the effects of the COVID-19 pandemic on gender equality on health, social, and economic indicators: a comprehensive review of data from March, 2020, to September, 2021. Lancet. 2022;399(10344):2381-2397. Available at: https://doi.org/10.1016/S0140-6736(22)00008-3.

30. Peng J, Wu WH, Doolan G, Choudhury N, Mehta P, Khatun A, et al. Marital Status and Gender Differences as Key Determinants of COVID-19 Impact on Wellbeing, Job Satisfaction and Resilience in Health Care Workers and Staff Working in Academia in the UK During the First Wave of the Pandemic. Front Public Health. 2022;10:928107. Available at: https://doi.org/10.3389/fpubh.2022.928107.

31. Davis M, O Connell T, Johnson S, Cline S, Merikle E, Martenyi F, et al. Estimating Alzheimer's disease progression rates from normal cognition through mild cognitive impairment and stages of dementia. Curr Alzheimer Res. 2018;15(8):777-88. Available at: https://doi.org/10.2174/1567205015666180119092427.

32. Cruz-Jimenez M. Normal changes in gait and mobility problems in the elderly. Phys Med Rehabil Clin N Am. 2017;28(4):713-25. Available at: https://doi.org/10.1016/j.pmr.2017.06.005.

33. da Silva RA, de Souza Ferreira LP, Leite JMRS, Tiraboshi FA, Valente TM, de Paiva Roda VM, et al. Statistical Modeling of Deaths from COVID-19 Influenced by Social Isolation in Latin American Countries. Am J Trop Med Hyg. 2022;106(5):1486-90. Available at: https://doi.org/10.4269/ajtmh.21-0217.

34. Shur NF, Creedon L, Skirrow S, Atherton PJ, MacDonald IA, Lund J, et al. Age-related changes in muscle architecture and metabolism in humans: The likely contribution of physical inactivity to age-related functional decline. Ageing Res Rev. 2021;68:101344. Available at: https://doi.org/10.1016/j.arr.2021.101344.

35. Oehlschlaeger MHK, Pinheiro RT, Horta B, Gelatti C, San'Tana P. Prevalence of sedentarism and its associated factors among urban adolescents. Rev Saude Publica. 2004;38(2):157-63. Available at: https://doi.org/10.1590/s0034-89102004000200002.

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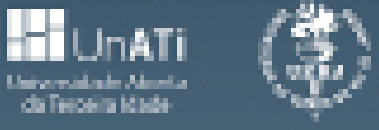
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