


Discontinuation of Health Interventions Among Brazilian Older Adults During the Covid-19 Pandemic: REMOBILIZE Study

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Abstract

The objective of this study was to analyze changes in access to health interventions during the pandemic among Brazilian older adults and to investigate the factors associated with social and health inequalities. We conducted an online survey with Brazilian adults aged 60 + years between May and June 2020. A multidimensional questionnaire was used to investigate access to health interventions during the pandemic and associated factors. Of 1482 participants, 56.5% reported health care before the pandemic, and 36.4% discontinued it during the pandemic. The discontinuation rate was 64.4% (95% CI 61.1-67.6). Participants with higher educational level (nine or more years of education: OR 0.34; 95% CI 0.17-0.70) and higher income (eight or more times the minimum wage: OR 0.54; 95% CI 0.36-0.81) were associated with less probability of discontinuation. Presenting multimorbidity (OR: 1.42; 95% CI 1.06-1.90) and polypharmacy (OR: 0.61; 95% CI 0.46-0.81) were associated with discontinuity in health interventions. Our study showed that structural health inequities in access to health care shaped the rates of discontinuation in health care interventions during the COVID-19 pandemic. Strategic actions should be set up to actively monitor socially vulnerable older adults and strengthen community-based services to mitigate the discontinuation of health care interventions.

Keywords

older adults, geriatric care, discontinuation of health care, COVID-19 pandemic

The SARS-CoV-2 pandemic, the novel coronavirus, has reached worldwide and grown into a public health crisis, requiring interventions to reduce the disease, such as distancing and social isolation.^{1,2} However, there was no consensus on a national policy for protective measures in Brazil, generating an alarming scenario of more than 17 million confirmed cases, with almost 500,000 deaths (June 2021).³ Not surprisingly, health services and health care workers were fighting on the frontlines to combat the pandemic, with severe consequences for the system and those in need of care.^{4,5}

The coronavirus disease 2019 (COVID-19) has a significant impact among older adults, who represent, globally, 31% of cases of infection, 45% of hospitalizations, 53% of admissions to intensive care units, and 80% of deaths.^{6,7} In Brazil, hospital mortality increased with age, corresponding to 42%, 55%, and 66% of hospitalized patients aged 60 to 69 years, 70 to 79 years, and 80 years or more, respectively.⁸ Furthermore, older adults with low education, low income,

and black and brown skin color were more affected by COVID-19 and had more severe disease cases, revealing

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structural social and health inequities. These vulnerable groups have a greater number of comorbidities and disabilities, increasing the risk of aggravation and death as a result of COVID-19.^{8–10}

Necessary measures for COVID-19 care and containment of the pandemic can negatively affect older adults' physical and mental health. Recommendations to stay at home and to practice social distancing increased sedentary behavior and decreased physical activity levels, resulting in harmful consequences for mobility. In addition, restricted mobility outside the home increases loneliness and social isolation, while also reducing access to health care.^{1,11–14}

Since the beginning of the COVID-19 pandemic, there has been a record of health disruption in 90% of countries,¹⁵ including outpatient care, elective surgical procedures, and non-essential services.¹⁶ Interruptions in services during the COVID-19 pandemic may impact ongoing health care and cause harmful consequences, such as insufficient monitoring and treatment of noncommunicable diseases, delayed diagnoses, and surgical interventions.¹⁷ Health inequities greatly impact the course of the COVID-19 pandemic, with a disproportionate burden on people living with high socioeconomic vulnerability. It ultimately might hurt interruptions in health care.¹⁸ Societies with higher levels of income inequality are associated with poorer health outcomes, including a lower life expectancy, higher rates of obesity, and disabilities since the pandemic period.

The evidence before the COVID-19 pandemic pointed to differences and inequalities in the access to and continuity of health treatments in developing countries. In this case, the concept of access was related to maintaining or improving health by receiving health care. The determinants of access and continuity of health care services are related to contextual and individual factors. According to the classical model of Andersen and Newman, individual factors encompass predisposing characteristics (such as age and sex), enabling characteristics (such as education level and income), and health needs.¹⁹ Adherence to long-term therapeutic programs, such as rehabilitation, is an additional challenge due to the lack of transport and social support, sociodemographic factors, and health needs. A previous study observed a variation in the adherence according to the socioeconomic characteristics of the users.¹⁶ Disability and pain, for example, are greater predictors for the use of more health services.^{20,21} The search for health facilities is greater among women, older adults, and those living with a spouse. Having fewer comorbidities and low income is associated with not searching for care.^{5,21,22} Access and utilization of health services is also related to health systems and their organization, as the Brazilian Unified System is responsible for free, universal provision of health services and programs.^{22–24} However, in Brazil, the main problems have included hours of operation of health care facilities²⁰ and delays in receiving care in the public health system, including

scheduling a doctor visit, waiting to get the visit, accessing the health unit, and receiving home visits.^{20,22,23}

Social determinants can influence the interruption of health services and care during the COVID-19 pandemic, especially income, educational level, and clinical conditions (multimorbidity and polypharmacy). However, few studies have assessed treatment interruption during the COVID-19 pandemic among Brazilian older adults. Understanding the relationships between health system preparedness, health system capacity, and disruption is particularly important in a country marked by vast inequalities in socioeconomic characteristics (eg, housing and employment status) and other health risks (age structure, burden of chronic disease, and disability).

Inequalities and lack of continuity in health care result in fragmented treatments, higher hospital admissions, and avoidable visits to the emergency room.²⁵ Monitoring the discontinuation of health care among older adults can lead to collaboration and development of strategies for resuming care approaches after the period of social restriction. In the COVID-19 pandemic context, these surveys are necessary to prepare health professionals and policymakers to meet urgent demands and needs, as well as to expand on the existing literature that examines the lack of social and health equality and discontinuation of the use of and access to health care. We hypothesized that as health services were discontinued in Brazil during the pandemic, this did not occur homogeneously within the older population, but instead that those experiencing more social vulnerability were more affected. The present study aimed to analyze changes in access to health interventions during the pandemic among Brazilian older adults and to investigate the factors associated with social and health inequalities.

Methods

This research was a cross-sectional study, as part of the Study Network on Mobility in Aging (Remobilize Study), following STROBE guidelines for observational studies. The Remobilize Study has been conducting a longitudinal study with adults who are 60 years old and older and are residents of all five macro-regions of Brazil, aiming to assess the impact of the pandemic on mobility among Brazilian older adults. Baseline data were collected between May and June 2020, with a follow-up schedule of three, six, and 18 months. In this study, we analyze the baseline data, which refer to the first quarter of 2020, when the COVID-19 pandemic was declared a public health emergency in Brazil.

Data Collection Procedures

Community-dwelling older adults (age 60 years or more) of both genders were included. The study excluded participants who were bedridden and/or living at long-term care facilities. Participants who reported dementia or cognitive decline,

severe vision or hearing problems, or severe communication limitations could participate in the survey through interviews answered by proxy or by telephone contact with a trained interviewer.

According to the snowball sampling methodology, participant recruitment was carried out by convenience, in the local community, and through social media. Snowball sampling methodology is one in which a small number of individuals with the same characteristics indicate other people in their social network or community to participate in the study.²⁶ In this particular study, participants were recruited virtually by phone, social media groups (Facebook, Instagram, and WhatsApp), researchers' friends, family, patients, and ex-patients, who recruited more people and so on. We contacted community leaders and allied health professionals working in vulnerable regions to include participants with varied educational and income levels, ethnicities, and genders. More details can be found on the research homepage (<https://www.remobilize.com.br/us>) and in another publication (Perracini et al, 2021).

The Research Ethics Committee approved the University Cidade de São Paulo (CAAE: 31592220.6.0000.0064). Participants agreed with the terms of the survey by clicking on the button "I agree to participate" (for the online survey) or verbally (for telephone interviews).

Outcome

We considered the discontinuation of health care, and a range of self-care and health promotion behaviors before and during the COVID-19 pandemic, as the outcome variable. Health interventions were defined as services aiming to prevent and cure illnesses and to maintain health and well-being.^{27,28} These health interventions included medical appointment and follow-up (diagnosis and treatment), use of medications, rehabilitation (conventional physiotherapy, psychology, occupational therapy, speech therapy, hydrotherapy, global postural re-education), dentistry, and integrative therapies (acupuncture, yoga). Health behaviors included physical activities and health promotion, such as a gym, Pilates, hydrogymnastics, gymnastics, dance, seniors' gym, walking, and sports. Therefore, we categorized the variable into "continuity" (carrying out some care before and during the COVID-19 pandemic) and "discontinued" (carrying out some maintenance before but not during the COVID-19 pandemic).

Independent Variables

The independent variables included were sex, age group (60-69, 70-79, and 80 years old and over), race (white, black, brown, and yellow/indigenous, per the official classifications of the National Institute of Geography and Statistics in Brazil), income in minimum wages (up to 1, 2-3, 4-7, 8-10, and above 10), educational level in years (illiterate, 1-4, 5-8,

and 9 or more), number of comorbidities, polypharmacy (report of routine use of four or more medications²⁹), functional limitation, and presence of pain. We selected these variables according to the classic model by Andersen and Newman (1973),¹⁹ which considers individual factors such as predisposing characteristics (age and sex), facilitators (such as educational level and income), and self-reported health needs (comorbidity, polypharmacy, pain, and functional limitation), in addition to the social determinants of illness and health care in Brazil.³⁰

Based on participants' self-reports of medical diagnoses, the selected comorbidities were arthritis, osteoporosis, asthma, congestive heart failure, myocardial infarction, neurological disease, stroke or transient ischemic attack, peripheral vascular diseases, diabetes mellitus type I or II, upper gastrointestinal diseases, depression, anxiety or panic attacks, visual impairment, hearing impairment, degenerative disc diseases, obesity, high blood pressure, urinary incontinence, fecal incontinence, and dizziness/vertigo. We considered older people reporting two or more conditions as having multimorbidity.³¹

We assessed activity limitations using the Brazilian Multidimensional Functional Assessment Questionnaire (BOMFAQ). The participants reported their difficulty (yes/no) to perform 15 daily activities, including eight basic activities of daily living (BADLs) (eg, eating, bathing, and dressing) and seven instrumental activities of daily living (IADLs) (eg, shopping, taking medication at the correct time, and walking nearby home). The number of activities performed with difficulty was summed (0-15), and the participants were categorized into two groups: those with mild (0-3 activities) and those with moderate to severe functional limitation (≥ 4 activities).³²

Data Analysis

We compared all variables in the study among older adults who continued and discontinued some health care, using the Pearson's chi-square test to select the variables to be included in the multiple models. The discontinuation rate refers to the difference in the proportion of people who performed some care during and before the COVID-19 pandemic divided by the proportion of those who performed it before the COVID-19 pandemic. We used odds ratio (OR) and respective 95% confidence intervals by logistic regression to estimate associations between independent variables and the outcome. Factors that showed statistically significant associations ($p < 0.05$) with the outcome in the final model were selected as independent variables for adjustment of a multiple logistic regression model, which aims to estimate the predicted discontinuation probabilities. Predicted probabilities were presented with respective confidence intervals (95%). All analyses were performed using Stata software version 14.0 (StataCorp LLC, College Station, TX), and a statistical significance of 5% was considered.

Results

Demographics

In total, 1482 older adults were included in this study: 69.5% (n = 1030) and 30.5% (n = 452) answered the questionnaire by weblink and phone, respectively. As illustrated in Figure 1, more than half of the participants (56.5%) reported performing some health care before the COVID-19 pandemic. Of the total, 36.4% discontinued this care at the beginning of the COVID-19 pandemic. The discontinuation rate was 64.4% (95% CI: 61.1-67.6). Figure 2 shows the main health care discontinued during the pandemic, highlighting medical follow-up (47.5%), physical activity (30.9%), and rehabilitation (14.6%).

Associations Between Social and Health Conditions and Discontinuity

Table 1 shows the sociodemographic characteristics, region of residence, health conditions, and functionality of the sample. The sample was mainly composed of female older adults (74.0%), between 60 and 69 years old (56.1%), of race white (61.8%), with lower income (62.4% up to three minimum wages), with a high educational level (60.9% aged nine years or more), and from the Southeast and Northeast regions (together, 85.75%).

We found that sociodemographic social disparities (income, education, and race) and health condition (comorbidities and polypharmacy) were associated with discontinuing health care. Income of up to one minimum wage (39.1%

of participants) was associated with the discontinuation of health care. Compared to those who continued health care, those with race black (7.5%) and brown, yellow, or indigenous (33.7%) had higher discontinuation rates. For older adults with up to eight years of education, the discontinuation rate was higher than the continuity rate. On the other hand, a higher continuity rate for older adults with more than nine years of education was observed (72.2%). In addition, among those who discontinued health care, 45.0% reported two or more comorbidities, and 27.6% were using polypharmacy.

Table 2 presents the odds ratios (95% CI) of the adjusted multiple model. Income more than eight times the minimum wage (OR = 0.54, 95% CI = 0.36-0.81), educational level higher than nine years (OR = 0.34, 95% CI = 0.17-0.70), and polypharmacy (OR = 0.61, 95% CI = 0.46-0.81) were the associated variables that were less likely to be associated with discontinued health care. Those who presented two or more comorbidities had a higher chance of discontinued health care (OR = 1.42, 95% CI = 1.06-1.90).

We found that older adults with an income of more than eight times the minimum wage (63.8%, 95% CI: 54.8-62.9), those who use polypharmacy (69.3%, 95% CI: 64.9-73.8), and those with more than nine years of education (72.1%, 95% CI: 68.8-75.5) were the ones with the lowest probability of discontinued health care. In contrast, illiterate older adults, those with an income of up to one times the minimum wage (80.2%, 95% CI: 65.9-84.4), and those with two or more comorbidities (78.9%, 95% CI: 75.4-82.4) were the most likely to interrupt health care.

Figure 3 shows how the average discontinuation rate varied according to federation states represented by the participants in this study. Rio Grande do Sul, Santa Catarina, São Paulo, Acre, Goiás, Pará, Maranhão, Piauí, Paraíba, Alagoas, and Sergipe were the states with the highest discontinuation rates, ranging from 91.6% to 100%. Amazonas, Paraná, Rio de Janeiro, Espírito Santo, Ceará, and Rio Grande do Norte were the states with the lowest rates of discontinuation, from 56.2% to 85.6%.

Discussion

In this study, we found that greater levels of social inequality (as measured by income and educational status) and the presence of multimorbidity and polypharmacy in community-dwelling older adults were related to an increased likelihood of discontinuation of health interventions, even after controlling for potential confounders factors. This study indicates an overall health care discontinuation rate of 64.4% among Brazilian older adults during the first months of the COVID-19 pandemic. Among all types of health care services, medical interventions were the type most often discontinued during the pandemic.

Older adults with a higher number of comorbidities, low educational levels, and low income were more likely to

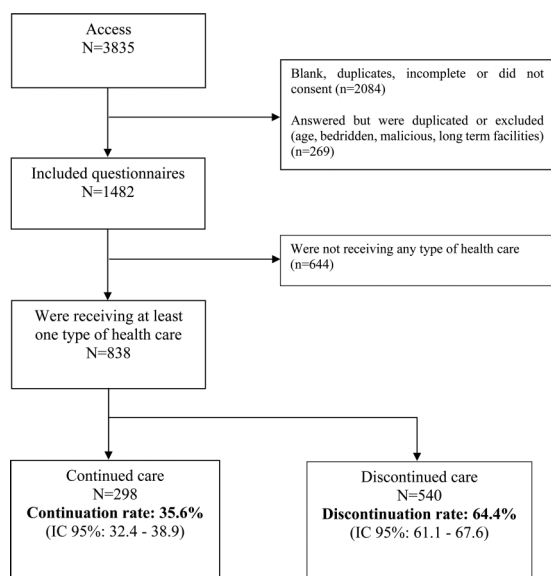


Figure 1. Flowchart of entry of participants in the study, together with prevalence and rates of health care before and discontinuation during COVID-19 pandemic among Brazilian older adults. Remobilize Study, 2020.

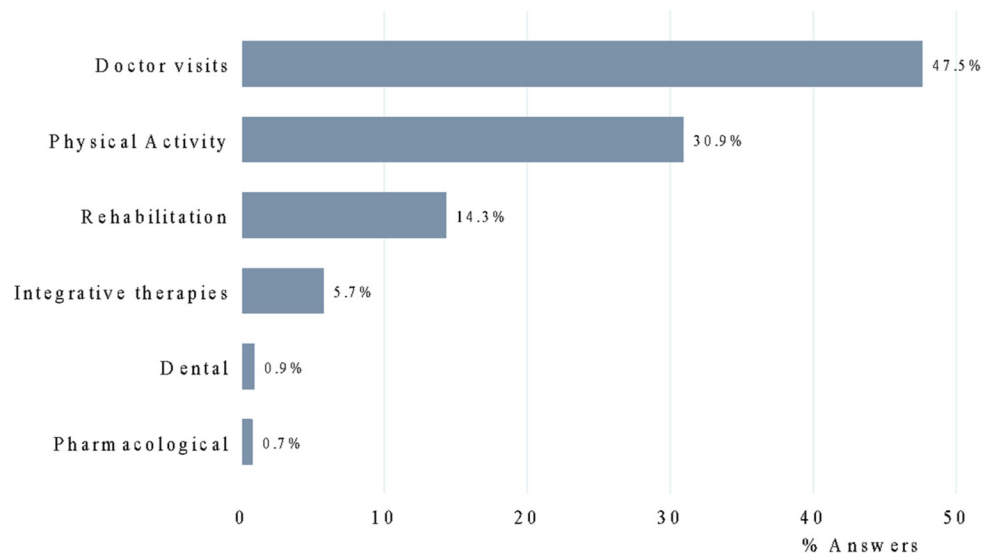


Figure 2. Discontinuity of health care before and during the COVID-19 pandemic among Brazilian older adults, according to self-report. Remobilize Study, 2020.

experience discontinuation in their health care. On the other hand, wealthy older adults with high educational levels and polypharmacy were less likely to interrupt health care interventions during the COVID-19 pandemic. Furthermore, there were multiple and varied discontinuation rates of health care in different regions of Brazil. Although continuity of health care is influenced by a variety of factors, including a person's cultural background, context environment, personal beliefs, and system organization,²⁵ our findings arguably suggest the existence of an association between social and health inequality and poor continuation of health care generally among older adults during the COVID-19 pandemic.

Several studies have reported some type of discontinuation rate. Almeida and colleagues (2021) described a worsening in the health status of 29.4% of the participants and a need for continuity care of treatment in 25.5%. Cancellations of medical appointments were reported by 68.8% of Americans over 64 years old, and nearly half of them reported that surgeries or medical procedures were canceled due to the COVID-19 pandemic.¹ In the same study, 1.4% of the participants reported not having the medical care they needed.¹ Macinko and colleagues (2020) also reported that 17.2% of Brazilian adults aged 50 and over had their medical appointments and elective surgical canceled during pandemic. Although our results pointed out a higher discontinuation rate when compared with the Brazilian study⁵ and a similar rate when compared with the American study,¹ our results encompass a wider range of health care activities, including rehabilitation services, medical appointments, surgeries, diagnostic procedures, and health promotion activities, while they only analyzed medical interventions. Furthermore, our study included participants aged 60 years and older, which is different from

the age group selected in these studies (50 + years and 64 + years, respectively).

Our results showed that health care discontinuation during the COVID-19 pandemic reflected Brazil's long-lasting structural social inequalities. The variables that explained higher rates of discontinuation in health interventions were income and educational inequality. In the literature, some studies have pointed to the widening of the social distance between the "haves" and "have nots," together with literacy divides, as possible explanations for poorer population health outcomes; both have been described as directly proportional to seeking health care, besides being associated with difficulty in accessing the health system.^{33,34} This is incredibly daunting in Brazil, where older people are among the poorest half of the population, with an average monthly income of R\$850 (US\$166.25) in 2019.³⁵ In this population, illiteracy rates reach 18.0% and are even higher among older adults who are black and brown (30.7%).³⁶ It is worth highlighting that, in homes where older adults are not the only source of income, they are still responsible for 70.6% of the total household income.³⁷ The economic and political crises of the 2010s had already reduced the relative advantage of low-income older adults in spending directly on health care.³⁷ However, older adults with lower incomes have a 30% higher chance of having catastrophic expenditures (ratio between disbursement for health and total household income) than those with higher income.³⁸

In 2020, with the COVID-19 pandemic, there was an 18% loss in the income generated by work in the Brazilian population.³⁷ Although most Brazilian older adults count on income from pensions and retirement (73.6%), researchers found that an even more significant decline in income for this group (22.0%)³⁷ could be explained by the reduction

Table 1. Sociodemographic Characteristics, Region of Residence, Health Conditions, and Functionality of Brazilian Older Adults, According to Reports of Health Care Before and During the COVID-19 Pandemic. REMOBILIZE Study, 2020.

Variables	Total 1482 (100%)	Health care		p-value
		Discontinuation 1062 (75.5%)	Continuation 346 (24.5%)	
Sex				0.297
Female	1096 (74.0)	798 (75.1)	250 (72.2)	
Male	386 (26.0)	265 (24.9)	96 (27.8)	
Age group (in years)				0.774
60–69	831 (56.1)	593 (55.8)	190 (54.9)	
70–79	420 (28.4)	308 (29.0)	98 (28.3)	
80+	229 (15.5)	161 (15.2)	58 (16.8)	
Skin color/ethnicity				0.012
White	914 (61.7)	624 (58.8%)	233 (67.6%)	
Black	100 (6.8)	80 (7.5%)	17 (4.9%)	
Yellow, brown, and indigenous	466 (31.5)	357 (33.7%)	95 (27.5%)	
Income (minimum wage ^a)				<0.001
Up to 1	512 (34.5)	416 (39.1)	82 (23.7)	
2–3	413 (27.9)	299 (28.1)	96 (27.8)	
4–7	267 (18.0)	171 (16.1)	74 (21.4)	
8+	290 (19.6)	177 (16.7)	94 (27.2)	
Educational level (years of study)				<0.001
Illiterate	117 (7.9)	105 (9.9)	11 (3.2)	
1–4	282 (19.0)	221 (20.8)	54 (15.6)	
5–8	181 (12.2)	145 (13.6)	31 (9.0)	
9+	902 (60.9)	592 (55.7)	250 (72.2)	
Region				0.744
South	56 (3.8)	39 (3.6)	14 (4.1)	
Southeast	638 (43.1)	467 (44.0)	150 (43.4)	
Midwest	54 (3.6)	40 (3.8)	8 (2.3)	
Northeast	630 (42.6)	444 (41.8)	151 (43.6)	
North	102 (6.9)	72 (6.8)	23 (6.6)	
Comorbidity ^b (two or more)	639 (43.2)	478 (45.0)	121 (35.0)	0.001
Polypharmacy ^c	458 (30.9)	293 (27.6)	150 (43.4)	<0.001
Presence of pain	406 (27.4)	295 (28.8)	92 (26.6)	0.674
Functional limitation moderate to severe ^d	314 (21.2)	232 (21.8)	75 (21.7)	0.954

Missing: 74 participants (4.9%), referring to the older adults who did not undergo treatment before the COVID-19 pandemic.

^aMinimum wage = R\$1.045.00.

^bIncludes arthritis, osteoporosis, asthma, congestive heart failure, myocardial infarction, neurological disease, stroke or transient ischemic attack, peripheral vascular disease, diabetes mellitus type I or II, upper gastrointestinal disease, depression, anxiety or panic attacks, visual changes, hearing impairment, degenerative disc diseases, obesity, high blood pressure, urinary incontinence, fecal incontinence, and dizziness/vertigo.

^cRoutine use of four or more medications.

^dScore ≥ 4 on the BOMFAQ, which assesses the following daily activities (ADLs and IADLs): lying down or getting out of bed, eating, brush the hair, walking on a plane, taking a shower, dressing, going to the bathroom on time, climbing stairs, taking medication, walking the neighborhood, shopping, preparing meals, cutting toenails, driving, and cleaning the house.

in non-essential work activities during the pandemic period.³⁸ It was possible to observe a gradient effect between higher income and lower chance of discontinued health care, highlighting that income inequality influences health care adherence.

Contradictory to our results, Macinko and colleagues (2020)⁵ showed a higher prevalence of medical appointments cancellation (PR = 1.77; 95% CI: 1.32-2.38) among older adults with high educational levels (more than nine years of schooling). However, our results were not restricted to doctor appointments. We also observed a lower likelihood

of discontinued health care among older adults with more than eight times the minimum wage. Older people with a high income and high educational level have a wider range of alternatives to continue their health care, such as using digital technologies (eg, telemedicine, telerehabilitation),³⁹ private cars for transportation to health care appointments, and exams that are frequently covered by their insurance packages.

Curiously, multimorbidity and polypharmacy markedly influenced discontinuation of interventions. Previous studies show that people with multimorbidities present

Table 2. Factors Associated with Treatment Discontinuation During the COVID-19 Pandemic. REMOBILIZE Study, 2020.

Variables	Odds Ratio	95% IC
Female sex (ref.: male)	1.18	0.88–1.57
Age group (in years)		
60–69	1.00	
70–79	0.94	0.70–1.27
80+	0.84	0.56–1.27
Skin color/ethnicity		
White	1.00	
Black	1.39	0.79–2.45
Yellow, brown, or indigenous	1.06	0.79–1.41
Income (minimum wage ^a)		
Up to 1	1.00	
2–3	0.76	0.53–1.09
4–7	0.65	0.43–0.98
8+	0.54	0.36–0.81
Educational level (years of study)		
Illiterate	1.00	
1–4	0.50	0.25–1.00
5–8	0.56	0.27–1.20
9+	0.34	0.17–0.70
Region		
South	1.00	
Southwest	1.01	0.52–1.93
Midwest	1.34	0.49–3.67
Northeast	0.94	0.49–1.81
North	0.92	0.42–2.03
Comorbidity ^b (two or more)	1.42	1.06–1.90
Polypharmacy ^c	0.61	0.46–0.81
Presence of pain	1.17	0.87–1.57
Functional limitation moderate to severe ^d	0.95	0.66–1.37

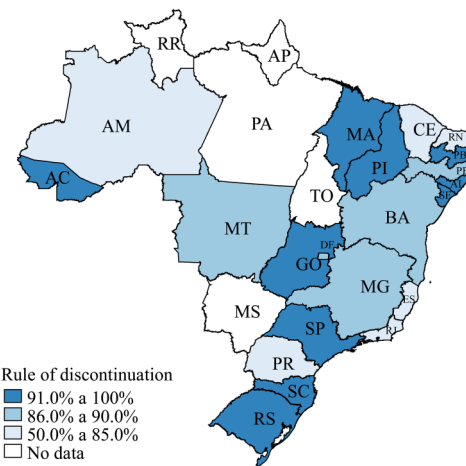
^aMinimum wage = R\$1.045,00.

^bIncludes arthritis, osteoporosis, asthma, congestive heart failure, myocardial infarction, neurological disease, stroke or transient ischemic attack, peripheral vascular disease, diabetes mellitus type I or II, upper gastrointestinal disease, depression, anxiety or panic attacks, visual changes, hearing impairment, degenerative disc diseases, obesity, high blood pressure, urinary incontinence, fecal incontinence, and dizziness/vertigo.

^cRoutine use of four or more medications.

^dScore ≥ 4 on the BOMFAQ, which assesses the following daily activities (ADLs and IADLs): lying down or getting out of bed, eating, brush the hair, walking on a plane, taking a shower, dressing, going to the bathroom on time, climbing stairs, taking medication, walking the neighborhood, shopping, preparing meals, cutting toenails, driving, and cleaning the house.

30% more probability of seeking health care.^{20,40} Patients with multimorbidity and polypharmacy are recognized as high utilizers of health care resources. The COVID-19 pandemic led to unique daily life experiences for members of the older population because they were recommended to stay at home and restrict social contact. A substantial increase in doctor appointments cancellations of 1.5 and 1.9 times higher among older adults with two and three comorbidities was also observed.⁵ Fear of being infected and the

**Figure 3.** Variation in the discontinuation rate of health care for older adults representatives of each Brazilian state. Remobilize Study, 2020.

widespread information that older people with multimorbidity were at a high risk of death and intensive care unit hospitalization possibly explain this population's adherence to social distancing.⁴

Older adults who used polypharmacy were less likely (OR = 0.61 95% CI: 0.46–0.81) to discontinue their health treatments. This can be explained by the fact that many medications need a prescription to be purchased. Older adults who attend regular medical appointments have a 1.9 times greater chance of using polypharmacy.⁴¹ Although the use of multiple medications is not ideal for older adults due to drug interactions, the ideology of medicalization and the health care model centered on exposure to drugs still prevail as a concept for treating diseases.⁴¹ The probability of health care discontinuation was lower in all age groups among those who consumed four or more medications simultaneously (0.70%, 0.69%, and 0.67%, respectively, for 60–69 years old, 70–79 years old, and 80+ years old) compared to those who did not use polypharmacy. During the COVID-19 pandemic, essential initiatives to guide patients and physicians were necessary for keeping compliance with drug treatment. As a strategy to minimize long-term negative results, the European Society of Cardiology issued an information note for physicians and patients not to discontinue antihypertensive drug treatment, as it could lead to a greater risk of infection and severity of COVID-19.⁴² The Brazilian government recommended actions to avoid interruptions in health care,⁴³ but with a fragmented and uncoordinated effort. Other institutions, such as Fiocruz, also developed documents to support actions for the continuity of health care among specific groups, such as individuals under mental health care.

Our results also revealed that about a third of the older adults reduced their practice of physical exercise during the COVID-19 pandemic. Increased sedentary behavior was

reported by 14.9% of the Brazilian population during the COVID-19 pandemic compared to the pre-pandemic period. Motivation to perform exercise changed for the Brazilian general population before and after the pandemic, decreasing 4.4% for performance-related motivation and increasing 6.7% for health-related motivation.¹³ Our results showed higher interruption values, which can be explained because they are related to an older sample.

Foreseen consequences of an older population that discontinued crucial health care actions such as physical activity and disease management are alarming. If this reality remains in the medium and long terms, a higher rate of falls, cardiorespiratory problems, obesity, and difficulty in engaging with medication and worse psychological conditions could be seen shortly.⁴⁴ Additionally, Brazil has huge social and health inequities,²³ which were deeply worsened during the COVID-19 pandemic. There is an expected increase in health demand in post-COVID-19 treatment, which will add to the consequences of the discontinued health care and overload the Unified Health System, which is already fragile in terms of human and financial resources and poorly prepared for long-term care.

The COVID-19 pandemic amplified substantial health care inequities. Although we cannot infer causality, our study provides some insights into changes to access to health interventions and ways to customize continuity based on socioeconomic and health conditions. Indeed, our findings of an association between more significant social and health inequality levels among older adults and an increasing likelihood that respondents would discontinue their health care may support this theory. Intervention support could be strengthened among older adults with a low socioeconomic level, including emphasis on self-health management and routine care, creation of an alternative for health interventions, and deepening of public understanding of access and utilization.⁴⁵ Restriction of social interaction and mobility during the pandemic among older adults confined at home needs to be actively monitored by health services. The rapid pace of change during the pandemic revealed the limitations of the delivery modes and raises questions about whether our current health care system, and its financing, can support these changes and ensure that they improve quality and equity.⁴⁶ The most immediate changes were the scaling up of telehealth and in-home care, which may be particularly useful in managing both care of older adults patients and routine visits. For example, as an alternative to face-to-face health care, the Federal Councils of health professionals recognized teleassistance during the COVID-19 pandemic as an option.⁴⁷ Although promising, this resource does not reach a large part of the Brazilian population, especially older people with low educational levels and low income, who are much more likely to have digital illiteracy and poor access to the Internet. Our study suggests that public policies in Brazil designed to improve access to and use of health services for the population may work best when supported by policies to

promote greater economic equality among Brazilian older adults, even considering the pandemic context.

Limitations

Although the present study is one of the few carried out on this topic during the pandemic and including participants living in different regions of Brazil, it is essential to highlight some limitations. First, we included a convenience sample using a digital interface, the interviews were conducted online and by phone calls, and there was unequal distribution between geographic macro-regions. Using a digital interface may have excluded some groups of older people and therefore does not guarantee our sample represents Brazil's older population in general. It is noteworthy that women, people who define themselves as white, and people with higher educational levels account for a disproportionate share of our sample in comparison to national data. This limits the external validation of our study, but it was the only feasible approach in the context of the COVID-19 pandemic. A second limitation is that the study has a cross-sectional design, precluding causal or risk inferences. For example, some older adults could have stopped using health services due to no longer needing them or completing treatment for acute or temporary conditions. There is a need for future longitudinal studies to explore these issues and to identify specific strategies for continuing treatments under unfavorable circumstances. Third, memory bias may have reduced the reliability of participant responses about their health care before the COVID-19 pandemic.

Conclusion

There appears to be a strong association between social and health inequality and the likelihood that older adults will self-report discontinuation health care during the COVID-19 pandemic period. High discontinuation rates in health interventions among Brazilian older adults were identified, and individuals with multimorbidity, low income, and low educational levels were more affected during the pandemic. Strategies for maintaining services within social protection measures could partially mitigate the adverse effects of discontinuity in health care during the COVID-19 pandemic. Proactive and coordinated actions to seek out vulnerable older groups that interrupted treatments are urgently needed to mitigate the negative consequences of discontinued health care. While addressing unmet needs remains a priority, studies investigating the impacts of discontinuation among specific groups might help avoid redundancies in health care provision and better allocate health systems resources in the post-pandemic era.

Declaration of Conflicting Interests

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Author contribution

G.O participated in data collection, conception to manuscript, interpretation, final revision. M.R.P participated in concept design, data collection, data analysis, interpretation, drafting, critical revision, and approval of the article. D.S.P, A.S., and E.D participated in concept design, interpretation, critical revision, and approval of the article. C.A.L.: participated in concept design, conception to manuscript, interpretation, critical revision, and approval of the article. J.S.C.A participated in data collection, data analysis, interpretation, critical revision, and approval of the article.

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References

- Heid AR, Cartwright F, Wilson-Genderson M, Pruchno R. Challenges experienced by older people during the initial months of the COVID-19 pandemic. *Gerontologist*. 2021;61(1):48–58. doi:10.1093/geront/gnaa138
- Fuller HR, Huseth-Zosel AH. Lessons in resilience: initial coping among older adults during the COVID-19 pandemic. *Gerontologist*. 2021;61(1):114–125. doi:10.1093/geront/gnaa170
- Coronavírus Brazil. Ministry of Health. Brazil, 2021. Available from: <https://covid.saude.gov.br>. [Cited 2021 Jun 30].
- Lima-Costa MF, Mambrini JVM, Andrade FB, Peixoto SWV, Macinko J. Social distancing, use of face masks, and hand washing among participants in the Brazilian longitudinal study of aging: the ELSI-COVID-19 initiative. *Cad Saúde Pública*. 2020;36(3):e00193920. doi:10.1590/0102-311X00193920
- Macinko J, Woolley NO, Seixas BV, Andrade FB, Lima-Costa MF. Health care seeking due to COVID-19 related symptoms and health care cancellations among older Brazilian adults: the ELSI-COVID-19 initiative. *Cad Saúde Pública*. 2020;36(3):e00181920. doi:10.1590/0102-311X00181920
- Esme M, Koca M, Dikmeer A, et al. Older adults with coronavirus disease 2019: a nationwide study in Turkey. *J Gerontol A Biol Sci Med Sci*. 2021;76(3):e68–e75. doi:10.1093/gerona/glaa219
- Couteur DG, Anderson RM, Newman AB. COVID-19 through the lens of gerontology. *J Gerontol A Biol Sci Med Sci*. 2020;75(9):e119–e120. doi:10.1093/gerona/glaa077
- Ranzani OT, Bastos LS, Gelli JGM, et al. Characterisation of the first 250000 hospital admissions for COVID-19 in Brazil: a retrospective analysis of nationwide data. *Lancet Respir Med*. 2021;9(4):407–418. doi:10.1016/S2213-2600(20)30560-9
- Terracciano A, Stephan Y, Aschwanden D, et al. Changes in subjective age during COVID-19. *Gerontologist*. 2021;61(1):13–22. doi:10.1093/geront/gnaa104
- Bui CN, Peng C, Mutchler JE, Burr JA. Race and ethnic group disparities in emotional distress among older adults during the COVID-19 pandemic. *Gerontologist*. 2021;61(2):262–272. doi:10.1093/geront/gnaa217
- Schrack JA, Wanigatunga AA, Juraschek S. After the COVID-19 pandemic: the next wave of health challenges for older adults. *J Gerontol A Biol Sci Med Sci*. 2020;75(9):e121–e122. doi:10.1093/gerona/glaa102
- Kim HH, Jung JH. Social isolation and psychological distress during COVID-19 pandemic: a cross-national analysis. *Gerontologist*. 2021;61(1):103–113. doi:10.1093/geront/gnaa168
- Sonza A, Sá-Caputo DC, Bachur JA, Araújo MGR, Trippo KV, Gama DRN. Brazil Before and during COVID-19 pandemic: impact on the practice and habits of physical exercise. *Acta Biomed*. 2020;92(1):e2021027. doi:10.23750/abm.v92i1.10803
- OPAS. Organização Pan-americana de Saúde. *Considerações sobre a reabilitação durante o surto de COVID-19*. 23 p., 2020. Portuguese.
- WHO. World Health Organization. *Pulse survey on continuity of essential health services during the COVID-19 pandemic*. 21 p., 2020.
- Bettger JP, Thoumi A, Markevich V, et al. COVID-19: maintaining essential rehabilitation services across the care continuum. *BMJ Glob Health*. 2020;5(5):1–7. doi:10.1136/bmjgh-2020-002670
- Moynihan R, Sanders S, Michaleff ZA, et al. Impact of COVID-19 pandemic on utilization of healthcare services: a systematic review. *BMJ Open*. 2021;11(3):e045343. doi:10.1136/bmjopen-2020-045343
- Bambra C, Riordan R, Ford J, Matthews F. The COVID-19 pandemic and health inequalities. *J Epidemiol Community Health*. 2020;74(11):964–968. doi:10.1136/jech-2020-214401
- Andersen R, Newman JF. Societal and individual determinants of medical care utilization in the United States. *Milbank Mem Fund Q Health Soc*. 2005;83(4):1–28. doi:10.1111/j.1468-0009.2005.00428.x
- Levorato CD, Mello LM, Silva AS, Nunes AA. Factors associated with the demand for health services from a gender-relational perspective. *Cien Saude Colet*. 2014;19(4):1263–1274. doi:10.1590/1413-81232014194.01242013
- Dellaroza MSG, Pimenta CAM, Lebrao ML, Duarte YA. Associação de dor crônica com uso de serviços de saúde em idosos residentes em São Paulo. *Rev Saúde Pública*. 2013;47(5):914–922. Portuguese. doi:10.1590/S0034-8910.2013047004427.
- Silva AMM, Mambrini JVM, Peixoto SV, Malta DC, Lima-Costa MF. Use of health services by Brazilian older adults with and without functional limitation. *Rev Saúde Pública*. 2017;51(1):1s–10s. doi:10.1590/S1518-8787.2017051000243
- Osorio RG, Servo LMS, Piola SF. Unmet health care needs in Brazil: an investigation about the reasons for not seeking health care. *Cien Saude Colet*. 2011;16(9):3741–3754. doi:10.1590/S1413-81232011001000011
- Paim J, Travassos C, Almeida C, Bahia L, Macinko J. The Brazilian health system: history, advances, and challenges. *Lancet*. 2011;377(9779):1778–1797. doi:10.1016/S0140-6736(11)60054-8

25. WHO. World Health Organization. *Continuity and coordination of care*. 68 p., 2018.
26. Biernacki P, Waldorf D. Snowball sampling: problems and techniques of chain referral sampling. *Sociol Methods Res*. 1981;10(2):141–163. doi:10.1177/004912418101000205
27. Carrasquillo O. Health care utilization. In: Gellman MD, Turner JR, eds. *Encyclopedia of behavioral medicine*. Springer; 2013: 136 p.
28. WHO. World Health Organization. *Health systems: improving performance*. 215 p., 2000.
29. WHO. World Health Organization. *Medication without harm*. 2017.
30. Veras RP, Caldas CP, Cordeiro HA. Models of health care for the elderly: rethinking the meaning of prevention. *Physis*. 2013;23(4):1189–1213. doi:10.1590/S0103-73312013000400009
31. WHO. World Health Organization. *Multimorbidity: technical series on safer primary care*. 24 p., 2016.
32. Lins AES, Simon KA, Ramos LR. Functional performance in elderly women from an open university for the elderly in a north-east urban area. *Geriatr Gerontol Aging*. 2013;7(1):20–27.
33. Almeida WS, Szwarcwald CL, Malta DC, et al. Changes in Brazilians' socioeconomic and health conditions during the COVID-19 pandemic. *Rev Bras Epidemiol*. 2021;6(23): e200105. doi:10.1590/1980-549720200105
34. Singu S, Acharya A, Challagundla K, Byrareddy SN. Impact of social determinants of health on the emerging COVID-19 pandemic in the United States. *Front Public Health*. 2020;8:406. doi:10.3389/fpubh.2020.00406
35. IBGE. *Pesquisa nacional por amostra de domicílios contínua: educação 2019*. Instituto Brasileiro de Geografia e Estatística; 2020.
36. Faustino CG, Levy RB, Canella DS, Oliveira C, Novaes HMD. Income and out-of-pocket health expenditure in living arrangements of families with older adults in Brazil. *Cad Saúde Pública*. 2020;36(3):e00040619. doi:10.1590/0102-311X00040619
37. Camarano AA. Depending on the income of older adults and the coronavirus: orphans or newly poor? *Cien Saude Colet*. 2020;25(2):4169–4176. doi:10.1590/1413-812320202510.2.30042020
38. Bernardes GM, Saulo H, Fernandez RN, Lima-Costa MF, Andrade FB. Catastrophic health expenditure and multimorbidity among older adults in Brazil. *Rev Saúde Pública*. 2020;54(125):1–11. doi:10.11606/s1518-8787.2020054002285
39. Bardi G, Bezerra WC, Monzeli GA, Pan LC, Braga IF, Macedo MDC. Pandemic, social inequality and necropolitics in Brazil: reflections from social occupational therapy. *Revisbrato*. 2020;4(2):496–508. doi:10.47222/2526-3544.rbto34402
40. Souza ASS, Faerstein E, Werneck GL. Multimorbidity and use of health services by individuals with restrictions on habitual activities: the Pró-Saúde Study. *Cad Saúde Pública*. 2019;35(11):e00155118. doi:10.1590/0102-311X00155118
41. Pereira KG, Peres MA, Iop D, et al. Polypharmacy among the elderly: a population-based study. *Rev Bras Epidemiol*. 2017;20(2):335–344. doi:10.1590/1980-5497201700020013
42. Simone G. *Position statement of the ESC Council on hypertension on ACE-inhibitors and angiotensin receptor blockers*. ESCardio; 2020.
43. Ministério da Saúde. COVID-19 guia orientador para o enfrentamento da pandemia na Rede de Atenção à Saúde. 4th ed. Brasília, 2021. Available https://www.conasems.org.br/wp-content/uploads/2021/04/Covid-19_guia_orientador_4ed.pdf Access 16 Aug 2021.
44. Palmer K, Monaco A, Kivipelto M, et al. The potential long-term impact of the COVID-19 outbreak on patients with non-communicable diseases in Europe: consequences for healthy ageing. *Aging Clin Exp Res*. 2020;32(7):1189–1194. doi:10.1007/s40520-020-01601-4
45. Werner RM, Glied SA. COVID-induced changes in health care delivery – can they last? *N Engl J Med*. 2021;385(10):868–870. doi: 10.1056/NEJMp2110679
46. Werner RM, Hoffman AK, Coe NB. Long-term care policy after COVID-19 — solving the nursing home crisis. *N Engl J Med*. 2020;383(10):903–905. doi: 10.1056/NEJMp2014811
47. Caetano R, Silva AB, Guedes ACCM, et al. Challenges and opportunities for telehealth during the COVID-19 pandemic: ideas on spaces and initiatives in the Brazilian context. *Cad Saúde Pública*. 2020;36(5):e00088920. doi:10.1590/0102-311x00088920

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