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EMPIRICAL RESEARCH QUANTITATIVE

Perceived quality of life and associated factors in long COVID syndrome among older Brazilians: A cross-sectional study

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Abstract

Aims and objectives: This paper aims to: (a) determine the personal, sociodemographic, clinical, behavioural, and social characteristics of older Brazilians with clinical evidence of long COVID; (b) evaluate perceived quality of life and determine its association with personal, sociodemographic, behavioural, clinical and social variables; and (c) assess significant predictors of high perceived QoL.

Background: Given the inherent vulnerabilities of the ageing process, the older people are an at-risk group for both contagion of SARS-CoV-2 and the perpetuation of residual symptoms after infection, the so-called long COVID or post-COVID syndrome.

Design: A cross-sectional survey design using the STROBE checklist.

Methods: Brazilian older people with long COVID syndrome ($n = 403$) completed a phone survey measuring personal, sociodemographic, behavioural, clinical, and social characteristics, and perceived Quality of Life (QoL). Data were collected from June 2021–March 2022. A multiple linear regression model was performed to identify salient variables associated with high perceived QoL.

Results: The mean age of participants was 67.7 ± 6.6 years old. The results of the multivariate regression model showed that race, home ownership, daily screen time, musculoskeletal and anxiety symptoms, and work situation were the significant predictors of QoL among COVID-19 survivors.

Conclusions: Knowledge about the persistence of physical, emotional, and social symptoms of COVID-19 can help nurses and other healthcare providers to improve the management of survivors, bringing benefits to the whole society.

Relevance to clinical practice: Given the novelty of long-COVID and its heterogeneous trajectory, interventions focusing on the repercussions and requirements unique to more vulnerable older persons should be developed and these aspects should be included in public health recommendations and policymakers' concerns.

Patient or Public Contribution: No patient or public contribution was required to design, to outcome measures or undertake this research. Patients/members of the public contributed only to the data collection.

KEYWORDS
Brazil, cross-sectional study, long-COVID, older adults, quality of life

1 | INTRODUCTION

The COVID-19 pandemic has had repercussions on the health and Quality of Life (QoL) of people around the world, with higher mortality rates among the older people compared to the younger population (Dadras et al., 2022). In 2019, the world population aged 60 and over totalled 703 million. By 2050, one in six people will be over 65 years of age, about two-thirds of whom will live in developing countries such as Brazil (UN, 2019). The southern region of Brazil has a high proportion of the country's older population, and the state of Paraná has the fifth largest older population in the country (1.7 million older people corresponding to 15% of the state's population; IBGE, 2021).

With the global population ageing at an alarming rate, understanding the different factors that might affect the older people's QoL is critical to improving this vital element of healthy ageing. "Reducing the vulnerabilities of the elderly throughout the ageing process is essential for achieving high levels of QoL" (Figueira et al., 2021, p.117). Organised planning is required to promote healthy ageing. On this basis, the WHO Global Strategy on Ageing and Health produced the plan for the Decade of Healthy Ageing 2021–2030 (UN, 2020).

In 1995, World Health Organisation (WHO) defined QoL as an "individual's perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns" (World Health Organization, 2022, p.1). Currently, the QoL concept encompasses other facets of a person's well-being. Many authors emphasise a person's subjective judgements of the most essential aspects in their life, viewing QoL as a human perspective rather than an objective and measurable concept (Daundasekara et al., 2020). This definition of QoL considers how an individual perceives their inner condition as well as their relationships with others. QoL should be viewed as a complex interaction and balance between how individuals perceive their internal condition (e.g., physical/mental status, functional abilities) and how they perceive their connections with others (e.g., partners, friends, etc.; Salvador-Carulla et al., 2014). This equilibrium acquires particular relevance in the last stage of life when dependence and vulnerability are more common (Frías-Luque & Toledano-González, 2022).

Average life expectancy has improved significantly in the previous decades as a result of advances in medical care, such as technical developments and novel therapies. However, an increase in life expectancy is not necessarily associated with an increase in QoL. For this reason, all healthcare practitioners are warned to pay attention to QoL, especially in the unpredictable times in which we now live. The study of QoL in the pandemic scenario has been growing recently, and results confirm that a positive diagnosis of COVID-19 infection is associated with worse lifestyles and greater health risk behaviours, with consequent worsening in QoL (Rass et al., 2021), socioeconomic

What does this paper contribute to the wider global community?

Provide more information on the implications of the COVID-19 pandemic for the quality of life (QoL) in older populations. This study indicates that older participants perceived their QoL positively, despite the consequences associated with COVID-19. To improve the QoL of post-COVID-19 survivors, policymakers and healthcare practitioners need to investigate robust mental health and psychosocial strategies.

fragility, and physical and mental sequelae that limit daily life activities (Sutton et al., 2022). Given the vulnerability of older individuals to COVID-19 and its consequences, addressing the physical and mental well-being of the older people, as well as their QoL, is critical.

Since "long COVID became a burgeoning health concern, growing evidence has been focused on the long-term effects of COVID-19" (Rigoni et al., 2022, p.1). However, the full range of long-term health consequences of COVID-19 is largely unclear, and little is known about this phenomenon in older adults. Such information is crucial for providing appropriate post-COVID-19 rehabilitation and QoL promotion in this vulnerable group. As a result, the current study attempted to investigate QoL and its predictor factors among a Brazilian older adult sample.

1.1 | Background

Recent studies on the pathogenic behaviour of the new Coronavirus have identified repercussions beyond the respiratory symptom profile with the potential for involvement of the renal, hepatic, and circulatory systems, among others (Sugiyama et al., 2022). Damage of prolonged amplitude and unprecedented chronicity raises new questions about the persistent symptoms of COVID-19, which received the new classification of "long COVID" or "post-COVID" syndrome. This term is used to denote the presence and/or persistence of symptoms after the initial SARS-CoV-2 infection (Datta et al., 2020), "involving physical (breathlessness, fatigue, and anosmia), functional (reduced activity), mental (cognitive impairment), and psychological (anxiety and depression) domains" (Sathyamurthy et al., 2021, p.1). The long COVID phase, also known as post-acute sequelae (signs and symptoms that persist or develop after acute COVID-19), encompasses both continuing symptomatic COVID-19 (from 4–12 weeks) and post-COVID-19 syndrome (more than 12 weeks; Rigoni et al., 2022).

A recent study evaluated people treated for COVID-19 in hospital wards and intensive care units (ICU) and found persisting symptoms and worsening QoL after discharge (Garrigues et al., 2020). In the current pandemic scenario, a reduction in QoL of patients with long COVID can be expected, due to a biopsychosocial and spiritual decline. The social isolation implemented to contain the spread of COVID-19 indirectly affected QoL and the well-being of the older people due to effects on their physical, psychological and cognitive health. Given their susceptibility, becoming infected might be an increased cause of concern for this population, contributing to their general anxiety—a mental health condition known to decrease QoL in older persons (Lebrasseur et al., 2021). As a result, older persons may be more vulnerable to the immediate and long-term impacts of the COVID-19 pandemic than other age groups.

To the best of our knowledge, few studies have analysed the QoL of older adult COVID-19 survivors and its related factors. The widely used social-ecological model (SEM) may serve as a foundation for addressing COVID-19 effects among individuals (Cowan et al., 2021). Based on this model, several multilevel elements are interconnected and might influence COVID-19 responses, including variables at the individual (age, gender, race/ethnicity, lifestyles, COVID-19 symptoms), interpersonal (family and social support), and community level (high-risk settings, loss of employment, housing). This strategy can address interconnected goals for the achievement of the Sustainable Development Goals (SDGs), such as lowering disparities, increasing well-being, and assuring the socio-ecological system's resilience (Hynes, 2021).

In this regard, Brazil has been ranked as the second country in the world most severely hit by the pandemic. Therefore, research on the long-term consequences among survivors in Brazil may help other countries foresee some concerns (Dong & Bouey, 2020). Furthermore, insights tailored to the needs of older people are urgently needed in the context of the present COVID-19 crisis. Thus, the research questions were: How do older people with manifestations of long COVID evaluate their perceived QoL? What variables at the individual, interpersonal, and communal levels have influenced the QoL among older COVID-19 survivors?

1.2 | Aims and hypothesis

Guided by a social-ecological perspective, the aims of the study were: (a) to determine the personal, sociodemographic, behavioural, and clinical characteristics of older Brazilians with clinical evidence of long COVID; (b) to evaluate perceived QoL and determine its association with personal, sociodemographic, behavioural, clinical and social variables; and (c) to assess significant predictors of high perceived QoL. More specifically, we hypothesize that: (H1) there are significant differences in perceived QoL scores based on older people's characteristics; and (H2) personal, sociodemographic, behavioural, and clinical characteristics are explanatory factors of high perceived QoL.

2 | METHODS AND MATERIALS

2.1 | Study design

This study is part of a multisite sequential explanatory mixed-method study entitled "Longitudinal follow-up of adults and elderly people who were discharged from hospital due to COVID-19," which aims to explore and analyse predictors, sequelae, repercussions, and consequences of COVID-19 in adults and older people who developed the severe form of the disease after hospital discharge (Salci et al., 2022).

In its quantitative component, this observational and cross-sectional study was carried out with a sample of older residents of the southern region of Brazil (Paraná) with clinical evidence of long COVID (temporal criterion of 12 weeks after an acute phase or hospital discharge; Datta et al., 2020). The STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) checklist was used in reporting this study (see Appendix S1).

2.2 | Setting and participants

The study was conducted in the state of Paraná, located in the southern region of Brazil. According to Siqueira Junior et al. (2021, p.556) during the first year of COVID-19 (from March 2020–March 2021), in the State of Paraná, the incidence was around "7404 per 100,000 inhabitants, mortality was 149.32 per 100,000 inhabitants, and the case-fatality rate was 2%". Like other south Brazilian states, Paraná had one of the country's highest admissions rates in hospital beds and ICUs due to COVID-19 (Zeiser et al., 2022), causing a sizeable burden on the hospital system.

Participants were recruited via purposive sampling from two COVID-19 surveillance datasets (Influenza Syndrome Epidemiological Surveillance System [SIVEP-Gripe] and the Notifica COVID-19 Paraná). The inclusion criteria for eligible participants were: (a) aged ≥ 60 years (United Nations [UN, 2020] defines older persons as those aged 60 years or over); (b) admitted to an inpatient ward or outpatient care unit with acute COVID-19 (according to the positive nucleic acid amplification test (NAAT) for SARS-CoV-2 in respiratory tract specimens); (c) long COVID symptoms after 12 weeks of disease onset; (d) registered on an epidemiological COVID-19 surveillance platform (SIVEP-Gripe or Notifica COVID-19 Paraná); (e) reachable by telephone and with sufficient communication ability; and (f) ability to give informed consent. Individuals were excluded if they developed a significant medical illness that made it impossible to participate in the study.

The sample size was chosen using the generally accepted rule of thumb of 10–15 observations for each predictor variable, required for multiple regression analyses (Babyak, 2004). Twenty-seven potential variables were included in this study; thus, the minimum was 270–405 participants. Through the epidemiological surveillance databases, 1500 potential participants with available telephone numbers who met the inclusion criteria were identified. Of these, only 403 were willing to participate in the study (response rate = 26.9%). The low response rates stem from the refusal to participate in the study and a high number of "do not know" responses.

2.3 | Data collection

Data was collected 12 months after the acute phase or hospital discharge of SARS-CoV-2 infection, between June 2021–March 2022. Personal information was extracted from individual registration forms in Brazil's two mandatory reporting epidemiological surveillance datasets of COVID-19: the Influenza Syndrome Epidemiological Surveillance System (SIVEP-Gripe), containing cases of hospitalisation for severe acute respiratory syndrome (SARS) due to COVID-19 (severe and moderate cases); and the information system specific for the state of Paraná, called Sistema Estadual Notifica COVID-19 (Notifica COVID-19 Paraná), containing outpatient cases or mild cases of the pathology. These notification systems contain many variables with a poor degree of completeness, which may compromise the quality of COVID-19 surveillance data. These limitations stem from the fact that healthcare professionals registered similar data several times for the same suspected or confirmed case of COVID-19, increasing their workload and potentially leading to data entry errors and missing data. Similar problems occur in many countries worldwide (Costa-Santos et al., 2021).

Interviews were conducted through audio-recorded telephone calls of approximately 30 min, with the aid of the electronic form. If the subject could not be reached on the first call, three further calls were attempted. Personal and demographic data were previously extracted from the electronic information systems and confirmed during the phone interviews. Data collection were carried out by nurses and students from courses in health (nursing, medicine, pharmacy, physiotherapy, and biomedicine) at the State University of Maringá, preceded by a training of at least 20 h. After making contact, interviewers identified themselves, asked the screening questions, and then applied the data collection instrument.

2.4 | Instruments

The phone survey, administered by trained healthcare providers and nursing students, implied collection of the dependent variable, namely the perceived QoL of the respondents, and several independent variables, including personal and sociodemographic characteristics, and behavioural, clinical and social variables, specifically:

1. Perceived QoL was rated on a single-item visual analogue scale (ranging from 1-lowest possible QoL to 7–highest possible QoL). This approach was used by Siebens et al. (2015) as a screening tool in clinical care. Higher scores mean a better QoL. QoL scores were split into three subcategories to form three QoL subgroups: low, average, and high. Participants in the "poor QoL" subgroup had a QoL score that was one standard deviation or more below the mean. The "average QoL" category contained people who scored close to the mean. Participants in the "high QoL" subgroup had QoL scores that were one standard deviation or more above the mean (Siebens et al., 2015;
2. Personal and sociodemographic characteristics included sex [male/female], age group [60–74 or ≥ 75] (75 years was considered the cut-off point between pre-old age and old age; Ouchi et al., 2017), race [white/non-white], years of education [<8 or ≥8], married or with partner [yes/no], religion [yes/no], living situation [lives with others/lives alone], and owning house [yes/no]). Body weight and height were also assessed to calculate the Body Mass Index (BMI). Based on previous studies for Brazilian populations, BMI was categorised into two levels (BMI ≤ 27, healthy weight/eutrophic; BMI > 27, overweight/obesity; ABESO, 2016);
3. Behavioural variables included yes/no responses to alcohol use, smoking habit, and practice of physical activity. Daily screen time (use of TV, computer, mobile phone) was categorised into two groups using the recommended threshold (≤3 or >3 h; Zhang et al., 2022);

4. Clinical variables involved the following questions: polypathology (≥5 comorbidities; [yes/no]; place of treatment [ambulatory/ inpatient ward/ ICU]). Whether the older person had at least one persistent symptom after 12 weeks of COVID-19 infection (up to 12 months) was assessed with dichotomous (yes/no) responses covering the neurological system [headache, dysfunctions in vision, smell, taste, speech, hearing, dizziness, loss of motor coordination, memory impairment and tingling/numbness], respiratory system [runny nose, sore throat, difficulty swallowing, hoarse voice, cough, phlegm production, chest pain and shortness of breath], digestive system [change in intestinal transit, change in appetite, nausea, cramps/abdominal pain], endocrine system [hair loss, sweating]; dermatological [spots and itching throughout the body], musculoskeletal system [joint problems and fatigue/tiredness], depressive mood and presence of anxiety symptoms;
5. Social variables included changes in work situation due to COVID-19, changes in income due to COVID-19, reception of financial aid, and need for support (by caregiver/family member). These variables were assessed using yes/no questions.

2.5 | Ethical considerations

The study was approved by the Standing Committee on Ethics in Research with Human Beings (COPEP) of the State University of Maringá-UEM (Protocol No. 34787020.0.0000.0104/2020), following the ethical precepts of Resolutions No. 466/2012 and No. 510/2016, of the National Health Council (CNS). All participants gave written and oral consent before interviews were conducted. No monetary gifts were given for completing the questionnaire. The collected data were used strictly for scientific study and was not shared with a third party.

2.6 | Data analysis

Summary statistics (i.e., mean, standard deviation, frequency, and percentage) were used to characterise participants. Since the missing values were limited to a few variables (less than 5%) and those variables were not critical to the analysis, we opted to exclude them from statistical calculations (Dong & Peng, 2013). Chi-square tests were used to find significance in categorical data. To identify the potential explanatory variables of high perceived QoL (score greater than 6), univariate and multivariate logistic regression models were used, and adjusted odds ratios were calculated. The statistical model was fit to adjust for covariates (age and sex). Significantly correlated variables (p-value ≤ .05) were included in the multivariate logistic regression model. To test for multicollinearity, the variance inflation factor (VIF) of QoL (1.01) was calculated and found to be within acceptable limits. Homoscedasticity was also assessed and verified. Statistical tests were performed with Software R version 4.2.0 (R Core Team, 2022).

3 | RESULTS

3.1 | Participant characteristics

Overall, 403 older people with long COVID participated in this study. The mean age of participants was 67.7 ± 6.6 years old (range: 60–93 years). Most were female (54.1%), between 60–74 years old (82.6%), white race (80.0%), with less than 8 years of schooling (54.1%), married or with a partner (64.5%), with religious beliefs (94.0%), living in their own house (80.9%), and living with others (77.2%). Most participants (n = 274) needed to be hospitalised after being diagnosed with COVID-19 infection. The symptoms that most predominated for 12 weeks (up to 12 months) were related to the musculoskeletal and neurological systems (43.9% and 37.7%, respectively), followed by the respiratory and endocrine systems (26.6% and 17.9%, respectively). The description of the sample is presented in Table 1.

3.2 | QoL levels and associations with independent variables

The overall average QoL for the research sample was 5.2 ± 1.2 (range: 1–7). Participants were divided into three categories based on their QoL scores: low (scores of 1–4), average (score of 5), and high (scores of 6 and 7). The univariate analysis showed that most participants (79.6%) had high QoL, followed by the older people with average QoL (10.7%) and low QoL (9.7%).

The following sociodemographic variables were significantly associated with QoL: race (p = .0003) and house ownership (p = .0471). Regarding behavioural variables, QoL was significantly associated with daily screen time (p = .0314). As for clinical data, QoL was significantly associated with musculoskeletal symptoms for 12 weeks (up to 12 months; p = .0196); depressive mood (p = .0261), and anxiety symptoms (p = .0111). The social factors significantly associated with QoL were changes in work situation due to COVID-19 (p < .0001), changes in income due to COVID-19 (p = .0006), and need for support (by caregiver/family member; p = .0149; see Table 2).

3.3 | Predictors of high perceived QoL

First, univariate logistic regression analyses assessed the association between dependent and independent variables. The following variables were significantly associated with QoL: race (non-white: OR = 0.57; 95% CI [0.34–0.96]; p = .0349); house ownership (No: OR = 0.48; <95% CI [0.25–0.93]; p = .0297); daily screen time (≥3 h: OR = 0.51; 95% CI [0.34–0.86]; p = .0113); polypathology (Yes: OR = 0.41; 95% CI [0.19–0.87]; p = .0201); presence of respiratory symptoms for 12 weeks (up to 12 months; Yes: OR = 0.59; 95% CI [0.35–0.99]; p = .0442); presence of musculoskeletal symptoms for 12 weeks (up to 12 months; Yes: OR = 0.51; 95% CI [0.31–0.83]; p = .0067); depressive mood for 12 weeks (up to 12 months;

TABLE 1 Sample description ($n = 403$)

Variables	Frequency (*n*)	Percentage (%)
Personal and sociodemographic variables		
Sex		
Male	185	45.9
Female	218	54.1
Age group (years)		
60–74	333	82.6
≥75	70	17.4
Race		
White	286	71.0
Other (Non-White)	108	26.8
Missing data	9	2.2
Body Mass Index (BMI)		
Low weight/ eutrophic (≤27)	138	34.2
Overweight / obesity (>27)	251	62.3
Missing data	14	3.5
Years of study		
<8	218	54.1
≥8	174	43.2
Missing data	11	2.7
Married or with a partner		
No	139	34.5
Yes	260	64.5
Missing data	4	1.0
Religion		
No	12	3.0
Yes	379	94.0
Missing data	12	3.0
Living situation		
Lives with others	311	77.2
Lives alone	87	21.6
Missing data	5	1.2
Owns house		
Yes	326	80.9
No	59	14.6
Missing data	18	4.5
Behavioural variables		
Alcohol use		
No	307	76.2
Yes	91	22.6
Missing data	5	1.2
Smoking habit		
No	386	95.8
Yes	12	3.0
Missing data	5	1.2
Practice of physical activity		
No	252	62.5
Yes	145	36.0
Missing data	6	1.5
Daily screen time (h)		
<3	265	65.8
≥3	123	30.5
Missing data	15	3.7
Clinical variables		
Polypathology (≥5 morbidities)		
No	370	91.8
Yes	33	8.2
Place of treatment		
Ambulatory	129	32.0
Inpatient ward	113	28.0
Intensive Care Unit	161	40.0
Neurological symptoms after 12 weeks (up to 12 months)		
No	251	62.3
Yes	152	37.7
Respiratory symptoms after 12 weeks (up to 12 months)		
No	296	73.4
Yes	107	26.6
Digestive symptoms after 12 weeks (up to 12 months)		
No	339	84.1
Yes	64	15.9
Endocrine symptoms after 12 weeks (up to 12 months)		
No	331	82.1
Yes	72	17.9
Dermatological symptoms after 12 weeks (up to 12 months)		
No	369	91.6
Yes	34	8.4
Musculoskeletal symptoms after 12 weeks (up to 12 months)		
No	226	56.1
Yes	177	43.9
Depressive mood after 12 weeks (up to 12 months)		
No	339	84.1
Yes	64	15.9
Anxiety symptoms after 12 weeks (up to 12 months)		
No	346	85.9
Yes	57	14.1
Social variables		
Changes in work situation due to COVID-19		
No	341	84.7
Yes	55	13.6
Missing data	7	1.7

(Continues)

(Continues)

TABLE 1 (Continued)

Variables	Frequency (*n*)	Percentage (%)
Changes in income due to COVID-19		
No	294	73.0
Yes	102	25.3
Missing data	7	1.7
Received financial aid		
No	312	77.4
Yes	82	20.4
Missing data	9	2.2
Need for support (by caregiver/family member)		
No	194	48.1
Yes	209	51.9

Yes: OR = 0.45; 95% CI [0.25–0.81]; $p = .0080$); anxiety symptoms for 12 weeks (up to 12 months; Yes: OR = 0.40; 95% CI [0.22–0.74]; $p = .0035$); changes in work situation due to COVID-19 (Yes: OR = 0.29; 95% CI [0.16–0.53]; $p = .0001$); changes in income due to COVID-19 (Yes: OR = 0.42; 95% CI [0.25–0.71]; $p = .0012$); and need for support (by caregiver/family member; Yes: OR = 0.48; 95% CI [0.29–0.80]; $p = .0050$).

Then, factors found to be significant in the univariate analyses, together with the covariates (age and sex) were analysed by a multivariate logistic regression, generating adjusted odds ratios. Six predictors had a significant association with perceived QoL in the adjusted analysis (Table 3). Levels of QoL were predicted to be higher among those individuals of white race (AOR = 0.43, 95% CI [0.23–0.82]; $p = .0098$) and with their own home (AOR = 0.41, 95% CI [0.19–0.89]; $p = .0252$) than non-whites and with other housing conditions. Compared to participants with ≥3 h daily screen time, elders with low times had 54% (AOR = 0.46, 95% CI [0.25–0.85]; $p = .0126$) higher probability of having high QoL. The probability of having musculoskeletal and anxiety symptoms after 12 weeks (up to 12 months) for participants with low levels of QoL was 51% (AOR = 0.49, 95% CI [0.26–0.93]; $p = .0284$) and 57% (AOR = 0.43, 95% CI [0.19–0.96]; $p = .0392$), respectively. Participants whose work situation changed due to COVID-19 reported lower odds of QoL than those with no changes (AOR = 0.34, 95% CI [0.15–0.74]; $p = .0066$).

Based on the obtained amount of Adjusted Coefficient of Determination (R^2 adjusted), the model explained 50.3% of the variance in QoL and there was a statistically significant relationship between the variables.

4 | DISCUSSION

The present study aimed to analyse the self-reported QoL in a sample of Brazilian older adults with long COVID and determine QoL predictors. The socio-demographic results of the current study show that non-white elders and those not owning their home (i.e., rented or assigned home) were less likely to self-report QoL as high. In Brazil, studies show the social profile of the population as mostly black and strongly impacted by social deprivation of housing, sanitation, education, employment, and income (Santos et al., 2020). Tavares et al. (2020) also corroborate these data, warning that low education, low income, and lack of good living arrangements increase the older people's susceptibility to COVID-19. The south (State of Paraná) and southeast of Brazil have a higher proportion of older people living in single-person households than other poorer regions, and higher rates of human development, life expectancy, and even proportion of older people (Negrini et al., 2018).

A higher percentage of older women was observed in the studied sample, but there was no significant association of gender with QoL. In contrast, most available research measuring sex differences in QoL reveals much lower levels among females than males. Moreover, the COVID-19 pandemic has disproportionately impacted women's mental health, even when they did not experience COVID-19. Recent studies have also shown a greater number of women with persistent post-COVID effects (Nandasena et al., 2022). Women show faster and more robust adaptive immune responses, which can protect them from the initial infection and its severity. However, this same difference can make women more vulnerable to prolonged illness (Sylvester et al., 2022).

Although no statistical association was found between years of education and QoL, the older people with less than eight years of schooling were more likely to self-report their QoL as poor/very poor. This finding corroborates results from a survey conducted in Vietnam with adults, 23.5% of whom were older people (Nguyen et al., 2020), which reported that people with higher levels of education and income were associated with higher QoL during the COVID-19 pandemic.

Several measures were adopted to contain the spread of the coronavirus, such as social isolation. However, as the pandemic progressed and the number of cases increased, maintaining isolation effectively became increasingly difficult (Silva et al., 2020), wherein living and working conditions played an important role. Indicators of housing conditions in Brazil are far from ideal for the majority of the population. In the present study, most of the older people have their own home, a condition significantly associated with high QoL and a greater probability of self-reporting the level of QoL as high (Silva et al., 2020). However, the physical structure of the participants' residences could not be verified. In Brazil, not all inhabitants have a house with enough rooms for its inhabitants or with a water supply and a sanitation system (Silva et al., 2020). Inequalities in access to resources affect not only those most at risk of infection but also those who are unable to adopt recommendations to slow the spread of the disease (Corbu et al., 2021), for example, homeless people, families without basic sanitation, prisoners, and low-wage workers.

Ageing and social isolation are common demographic phenomena in recent decades. Although there was no significant association between living situation and self-reported QoL, it is important to note that, in Brazil, 15.7% of people aged 60 years and over live alone, with a higher percentage in the South region (15.9%; IBGE, Instituto Brasileiro de Geografia e Estatística, 2021). Studies carried

TABLE 2 Univariate statistics among participants with low, average, and high QoL ($n = 403$)

Variables	High QoL (79,6%)	Average QoL (10,7%)	Low QoL (9,7%)	
Personal and sociodemographic variables	**%**	**%**	**%**	***p*-value***
Sex				
Male	47.0	46.5	35.9	.4177
Female	53.0	53.5	64.1	
Age group (years)				
60–74	82.9	72.1	92.3	.0528
≥75	17.1	27.9	7.7	
Race				
White	75.7	74.4	44.7	**.0003**
Other (Non-White)	24.3	25.6	55.3	
Body Mass Index (BMI)				
Low weight/eutrophic (≤27)	36.7	26.2	35.9	.4101
Overweight/obesity (>27)	63.3	73.8	64.1	
Years of study				
<8	53.4	65.1	63.2	.4246
≥8	46.9	34.9	36.8	
Married or with a partner				
No	33.6	41.9	36.8	.5489
Yes	66.4	58.1	63.2	
Religion				
No	2.6	2.3	7.9	.2820
Yes	97.4	97.7	92.1	
Living situation				
Lives with others	78.5	81.4	71.1	.4928
Lives alone	21.5	18.6	28.9	
Owns house				
Yes	88.2	82.5	73.7	**.0471**
No	11.8	17.5	26.3	
Behavioural variables				
Alcohol use				
No	76.6	74.4	84.6	.4790
Yes	23.4	25.6	15.4	
Smoking habit				
No	97.8	93.0	94.9	.1657
Yes	2.2	7.0	5.1	
Practice of physical activity				
No	61.6	67.4	74.4	.2505
Yes	38.4	32.6	25.6	
Daily screen time (h)				
<3	61.5	40.5	55.3	**.0314**
≥3	38.5	59.5	44.7	
Clinical variables				
Polypathology (≥5 morbidities)				
No	93.5	86.0	84.6	.0566
Yes	6.5	14.0	15.4	

(Continues)

TABLE 2 (Continued)

Variables	High QoL (79,6%)	Average QoL (10,7%)	Low QoL (9,7%)	
Personal and sociodemographic variables	**%**	**%**	**%**	***p*-value***
Place of treatment				
Ambulatory	33.0	18.6	38.5	.2130
Inpatient ward	26.5	39.5	28.2	
Intensive Care Unit	40.5	41.9	33.3	
Neurological symptoms after 12 weeks (up to 12 months)				
No	63.9	55.8	56.4	.4318
Yes	36.1	44.2	43.6	
Respiratory symptoms after 12 weeks (up to 12 months)				
No	75.7	62.8	66.7	.1189
Yes	24.3	37.2	33.3	
Digestive symptoms after 12 weeks (up to 12 months)				
No	85.0	81.4	79.5	.5851
Yes	15.0	18.6	20.5	
Endocrine symptoms after 12 weeks (up to 12 months)				
No	81.9	81.4	84.6	.9100
Yes	18.1	18.6	15.4	
Dermatological symptoms after 12 weeks (up to 12 months)				
No	92.5	90.7	84.6	.2391
Yes	7.5	9.3	15.4	
Musculoskeletal symptoms after 12 weeks (up to 12 months)				
No	59.5	39.5	46.2	**.0196**
Yes	40.5	60.5	53.8	
Depressive mood after 12 weeks (up to 12 months)				
No	86.6	74.4	74.4	**.0261**
Yes	13.4	25.6	25.6	
Anxiety symptoms after 12 weeks (up to 12 months)				
No	88.5	76.7	74.4	**.0111**
Yes	11.5	23.3	25.6	
Social variables				
Changes in work situation due to COVID-19				
No	89.9	73.2	67.6	**<.0001**
Yes	10.1	26.8	32.4	
Changes in income due to COVID-19				
No	78.2	64.3	51.4	**.0006**
Yes	21.8	35.7	48.6	
Received financial aid				
No	81.3	73.8	67.6	.1004
Yes	18.7	26.2	32.4	
Need for support (by caregiver/family member)				
No	51.7	37.2	30.8	**.0149**
Yes	48.3	62.8	69.2	

*Chi-square test of association.

Bold values indicate $p < .05$.

TABLE 3 Results of multivariate logistic regression analysis of variables that were associated with high perceived QoL

Model adjusted for sex and age: Dependent variable	High perceived QoL			
Independent variables	**Estimates**	**AOR 95% CI[a]**	***p*-value**	**Adj R^{2b}**
Personal and sociodemographic variables				
Race				
White	-	Reference	.0098	-
Other (Non-White)	−0.8423	0.43 (0.23;0.82)		
Owns house				
Yes	-	Reference	.0252	-
No	−0.8964	0.41 (0.19;0.89)		
Daily screen time				
<3 h	-	Reference	.0126	-
≥3 h	−0.7842	0.46 (0.25;0.85)		
Clinical variables				
Musculoskeletal symptoms after 12 weeks (up to 12 months)				
No	-	Reference	.0284	-
Yes	−0.7066	0.49 (0.26;0.93)		
Anxiety symptoms after 12 weeks (up to 12 months)				
No	-	Reference	.0392	-
Yes	−0.8486	0.43 (0.19;0.96)		
Social variables				
Changes in work situation due to COVID-19				
No	-	Reference	.0066	-
Yes	−1.0904	0.34 (0.15;0.74)		
Explained variance	-	-	-	0.503

[a]AOR adjusted odds ratio, CI confidence interval.
[b]Adjusted coefficient of determination.

out in other countries have shown an increase in the number of older people living alone, particularly women. Living with others is more common among the male population, while living alone is much more frequent among the female population, as pointed out by Negrini et al. (2018). A Brazilian survey carried out in the state of Minas Gerais pointed out that most older people living alone had between 1–4 years of education (Tavares et al., 2020). Another study indicated that 17% of older people with their own homes had between 8–10 years of education (Negrini et al., 2018).

Older persons in better economic positions have greater QoL than those in worse economic situations (Algahtani et al., 2021). In Brazil, people are encouraged to continue working to an older age, and there are approximately 7.5 million older persons in the workforce (Pazos & Bonfatti, 2020). Work activity helps the formation of self-identity among senior Brazilians, which includes self-esteem and a sense of usefulness. Furthermore, in the contemporary Brazilian context, the older people 's persistence in work is heightened by the new public pension system, which significantly increased the minimum retirement age of employees (Pazos & Bonfatti, 2020). In our study, participants who did not change their work conditions due to COVID-19 showed higher QoL (Duan et al., 2021). As suggested in previous studies (Zaninotto et al., 2009), "the elderly with lesser family associations demonstrated significantly poorer QoL than those with sufficient socialization" (Duan et al., 2021, p.7). Although the impact of COVID-19 on QoL was more marked in people with chronic health problems (Duan et al., 2021), we did not find this association in the present study.

Previous studies suggest healthy lifestyle behaviours are significantly associated with higher QoL. However, the present study found no significant association between BMI and QoL, which is consistent with earlier data (Siette et al., 2021). Nonetheless, our data analysis revealed high daily screen use (watching TV and using the internet at home) was associated with low QoL, in line with previous studies indicating association with negative health outcomes (Malta et al., 2020). A Brazilian study carried out with older people during the COVID-19 pandemic, 3 months after the beginning of social isolation measures, showed that there was an increase in hours of screen time during this period (4.2 h) and associated smartphone use with longer sitting time and a sedentary lifestyle, and consequently negative repercussions on health (Abdon et al., 2022). The literature provides evidence that, during the COVID-19 pandemic, excess screen time together with poor posture was accentuated during the period of social isolation (Abdon et al., 2022). In contrast, digital social interactions may have promoted the well-being of the

older people, serving as a primary resource for coping with loneliness during confinement (Siette et al., 2021), especially in the second wave of COVID-19.

However, the frequency of risk behaviours observed in this research (such as screen time) raises health concerns, such as increases in body weight and chronic non-communicable diseases. These results also support the findings of previous studies demonstrating greater symptoms of depression, anxiety, and stress among adults during the pandemic, directly impacting QoL (Rahman et al., 2020). Health professionals and stakeholders should heed these results and develop strategies to promote health at a population level, prioritising the most vulnerable groups, including the older people.

Social distancing and home confinement were implemented to contain the spread of the COVID-19 disease. Although effective, some research indicates that reduced socialisation due to physical distancing measures affected the health and psychological well-being of the older people, particularly the mental health and QoL of the older people (Siette et al., 2021).

Regarding the clinical variables associated with QoL, our findings were consistent with a recent observational study where COVID-19 survivors manifested more motor and respiratory complaints after hospitalisation (Damanti et al., 2022). Notably, our findings emphasise that individuals with depressive mood and anxiety symptoms were more likely to show lower QoL. A recent study found that patients with confirmed COVID-19 and persistent complaints had anxiety or depression 3 and 6 months following the beginning of COVID-19-related symptoms (Houben-Wilke et al., 2022). Another study found a link between COVID-19 infection and long-term declines in mental health and well-being, as well as short-term increases in financial difficulties among older persons (Lob et al., 2022).

Moreover, our results indicate that older people who have anxiety for 12 weeks (up to 12 months) were less likely to rate their QoL as high. An Australian study reported that fear of COVID-19 contagion is a long-term modifying factor of human relationships, which can lead the older people to greater social isolation and, in turn, to higher levels of anxiety (Siette et al., 2021). Conversely, prolonged stress can lead to anxiety, depression, and the inability to manage negative emotions, which can affect current and future social relationships (Saladino et al., 2020).

4.1 | Study limitations

The current study's limitations should be acknowledged. First, low-income older persons may not have access to mobile phones to participate in this study. Second, we applied a purposive sampling approach to recruit older adults from Paraná (Brazil). Third, due to the limited quality of the data from epidemiological surveillance systems, participant selection and hence sample size were constrained, thus jeopardising the validity of the results. Such an investigation strategy and sampling procedure may compromise the representativeness of the sample and outcomes. Fourth, causal relationships among the study variables could not be inferred, as the study was cross-sectional, and the survey's retrospective nature could have biased answers. To improve the robustness of the data, future research should expand the sample size to include other Brazilian states, use randomised sampling methods, and administer both phone and in-person surveys, including reliable and validated instruments that measure QoL and its multidimensionality.

Fifth, numerous phone calls were misinterpreted as telemarketing and hence were received negatively by potential responders, thus decreasing our response rate. Furthermore, designing a successful phone survey was difficult since the questions needed to be brief and specific to ensure comprehension. However, the majority of research dealing with post-COVID-19 has used telephone calls (Comelli et al., 2022) due to the high costs of in-person interviews and the social restrictions imposed by the COVID-19 pandemic, especially in vulnerable populations.

Lastly, there is no comprehensive picture of the physical and mental health status of the study sample before the infection. Despite these limitations, we believe this study reflects new data about the importance of focusing on health outcomes and social outcomes in post-COVID-19 survivors and the importance of an organised post-critical illness response to these survivors.

5 | CONCLUSION

The study population perceived their QoL positively. High level of QoL following infection was associated with white race, home ownership, fewer hours of daily screen time, lack of musculoskeletal and anxiety symptoms and no changes to work conditions. The results provided here may be useful when adopting public health and social measures to sustain older individuals' overall QoL and well-being during and after the COVID-19 pandemic. The measurement of QoL in COVID-19 survivors must be prioritised. Furthermore, we propose community-based healthcare programs to enhance the QoL of post-COVID-19 patients. When establishing such programs, the most impacted domains of QoL and the related variables should be evaluated.

6 | RELEVANCE TO CLINICAL PRACTICE

Nurses and health care services require data to predict the long-term needs of older people and improve their QoL after the infection. The therapeutic management of long COVID involves both a supportive approach and an approach to control specific symptoms. The supportive approach centres around caring for decompensated comorbidities (diabetes, hypertension), adopting healthy lifestyle habits (diet, physical activity), avoiding alcohol and smoking, improving the quality of sleep, and providing attention to mental health. The approach aimed at controlling specific symptoms implies a follow-up or basic treatment of long COVID symptoms. Health education groups for long COVID patients can help raise awareness of the syndrome and facilitate peer-to-peer

communication. In this sense, the position of nurse case manager, who attends to the patient and coordinates their care, is becoming increasingly important. Therefore, due to the complex demands after COVID-19 infection, it is essential to systematise and implement multidisciplinary post-infection care, identify the specific needs of each individual and plan comprehensive and individualised care.

Accurate data are critical for guiding public health policy and conducting research, especially when prior information is lacking. This study also emphasises the need to improve the quality of COVID-19 surveillance datasets through data input process simplification and healthcare professional training. Poor data entail potential repercussions, including poor decision-making or decisions not driven by data. Future research can shed light on the chronic nature of long-COVID and, as a result, the need for large-scale public health investments and social policy. Furthermore, nurses are highly exposed to the risk of post-COVID compared with other occupational groups. Hence, future studies should also test the long-term effects of the COVID-19 pandemic on nurse health.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study, in the collection, analyses, or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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